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Bases Labor Relations on Mutual Respect

E. M. Little, Gen. Man. Of Anglo American Pulp And Paper Co., Presents Brief On Behalf Of Canadian Pulp And Paper Industry To National War Labor Board—Forecasts Lumber Production Cut.

MONTREAL, Que., June 14, 1943—Strikes in certain paper mills following jurisdictional disputes between unions are now being made the subject of official investigation and have focussed attention on a brief presented to the National War Labor Board on behalf of the Canadian pulp and paper industry by Elliott M. Little, general manager of the Anglo-American Pulp and Paper Company and former director of National Selective Service in the Federal Labor Department.

Mr. Little urged the basing of sound employer-employee relations upon mutual respect and goodwill, with collective bargaining preferably on a voluntary basis.

Largest Single Industry Employer

Remarking that his brief was presented on behalf of the largest single-industry employer in Canada, Mr. Little said:

"Stability of employment is of primary importance to promote harmonious labor relations and avoid unrest. It is therefore the function of the government to institute such legislation as will ensure stable economic conditions favorable to maximum private initiative, with minimum restrictions consistent with the public interest.

"The best possible relationship between employers and employees will always be based on mutual respect and goodwill. Employers and employees must be ready at all times to meet together and deal with each other on a basis of equality, with due regard to the rights of these two parties and of the public. . . .

"It is our belief that collective bargaining agreements with employees should be negotiated by voluntary mutual agreement. . . .

Value Depends on Faithful Observance

"The value of any agreement depends upon its faithful observance. Once an agreement has been entered into between an employer and his employees it should be legally binding on both parties through its life; therefore labor legislation should incorporate a well-defined procedure to avoid the interim nullification of such agreements by jurisdictional disputes.

"We hope that labor organizations will come to believe in legislation making it necessary for them to register, to file annual returns of their officers, and to supply their members with annual statements in the same way as corporations under the Dominion Companies Act."

Mr. Little said there was widespread feeling among workers that the cost-of-living index did not truly represent movements in the cost of living.

"In order to remove this feeling prevailing among workers, we suggest that the government circulate in pamphlet form to workers a more simple formula than is available to date, explaining the mechanics covering methods used in arriving at cost-of-living index figures as reported in the Labor Gazette."

The association said it was convinced the present conciliation procedure under the industrial disputes inquiry act was not well adapted to wartime conditions, particularly in requiring a strike vote before a conciliation board was appointed.

Permanent Boards Recommended

For the duration of the war emergency establishment of permanent conciliation boards was recommended to deal more summarily with disputes other than wages which would continue under war labor boards.

Only those wartime measures neecssary to maintain economic stability should continue in the post-war period and in the transition from war to peace greatest possible freedom should be given industries to work out their problems and do their share in the rehabilitation of workers.

The brief recommended a progressive educational campaign through pamphlets, the press and radio explaining to workers the danger of inflation and the operation of the income tax deduction policy.

According to A. H. Williamson, timber controller for Canada, lumber production this year will be an estimated 80,000,000 feet below that of 1942, chiefly because of lack of manpower. Production last year was 4,800,000,000 feet.

Backlog Orders Still Rising in Midwest

Strong Paper Demand is Reported in Most Grades With More Cautious Buying—Supply Situation Tighter—Waste Paper Demand Heavier—End Use of Paper Being Studied—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., June 14, 1943—The order backlog continues to grow in this locality as paper sales outlets and jobbers offices report continued demand in virtually all grades. The "end use" program has brought about more careful buying as one not exactly expected result of the "essentiality" program but there is sufficient essential buying to make the market very tight. With mill production reported around 92%, buyers have brought prices to the top of the price levels allowed by law and the actual incentive to merchandise certain lines is rapidly being withdrawn as the squeeze is being accentuated.

Waste papers were in heavier demand during the week with the manpower situation still a very grave reason for lessened collections. Krafts were strong while sulphites ranged stronger in all grades with big backlogs built up. Groundwoods were sold "out" for perhaps a sixty day period, according to reports. Books and covers were in a similar position as all local offices worked with customers in an understanding of "end uses", allocations et cetera. It was, distinctly, a "sellers markets".

End Use Study Gets Results

A survey of Chicago's paper Jobbing and selling headquarters indicates clearly that the move to establish the essential end use of paper is likely to be one of the most constructive yet taken up by the industry. Several firms contacted refuse to take orders until the customer tells exactly what the paper is to be used for. If the paper is for war plant use, for newspapers or for essential civilian usage the information is carefully retained and summarized once a month to permit the paper mills to establish the background necessary to maintain the supply of pulp needed. By classifying on their individual needs, several firms here feel that they are doing more than establishing end usage for wartime—they are making it even more clear that the industry is one of the most vitally essential in the country in war or peace. If the information collected shows, say, 40% of business for government usage; 30% for war plants; 15% for essential civilian usage and a small "miscellaneous usage it is certain not only to convince WPB of paper's war time essentiality but to set the stage for a constructive and sound merchandising procedure in peace time. As a result of these questionnaires and sympathetic approach to the problem, the pulp situation here is considered not as critical as it was a month ago—and the industry has a much more clear conception of what it is up against.

Honor Gibson at Salesmen's Luncheon

The Salesmens Association of the Paper Industry, western division, held its most successful "surprise" event in many years last Monday, June 7. More than sixty sales executives and guests met at the Sherman Hotel to celebrate Charter Members Day and to pay specific homage to George K. Gibson as the founder and "beginner" of it all. Mr. Gibson, veteran of the Mosinee Paper Company, was the founder of the SAPEYES and the group celebrated the birthday of the organization by singing "Happy Birthday, Uncle George" while a beautiful birthday cake was brought in. The SAPEYES went a bit further and presented Mr. Gibson with just the kind of a memento he would treasure most—a bound volume of seventy-five personal letters written from paper trade executives the country over and all paying personalized tributes to one of the best loved men in the industry.

To wind up Mr. Gibson's part of the affair, Jim Coy read a personal letter to Mr. Gibson written by Joseph L. Fearing of International Paper Company, one of the Mosinee executive's closest friends. Another old friend, Dr. John Heuss, Rector of St. Matthews Episcopal Church in Evanston, made the presentation of the bound volume of letters. In return, a much surprised and pleased George Gibson responded in his usual effective way with a short history of the Salesmens Association and of what it had meant to him. He stated that the SAPEYES had never had to apologize for their position and urged that every effort be made to strengthen the unity and essentiality of the Association itself, adding that "now, more than ever, unity and essentiality were the key jobs".

Two charter members were present to aid Mr. Gibson in the observance of the big celebration. They were R. C. Johnson of the Fletcher Paper Company and J. R. Russell of the Marathon Paper Mills. Two other charter member veterans were ill and couldn't attend. They were George H. Fay of Mead Sales and W. A. Wrase of the Central Paper Company. Others of the charter member group from the Chicago area include E. A. Haynes of the Port Huron Sulphite and Paper Company, Lewis H. Sisson, Racquette River Paper Company and Creighton Whiting of the American Writing Paper Company.

C. E. Roach Continues To Improve

Word comes from Springfield, Illinois, that Corwine E. Roach, president of the National Paper Trade Association, is continuing to make rapid steps toward recovery. He will be able to go through his recuperative period without worrying too much about the N.P.T.A. affairs inasmuch as that organization has departed from precedent and appointed R. C. Kettels, Jr., as acting President to serve until Mr. Roach can again take up his duties. This action will be much appreciated by the Illinois merchant who has felt very badly about being unable to serve the Association during this critical year.

Good Twine Club Attendance Expected

The Paper and Twine Club has completed arrangements for its annual outing at Lake Wawasee and quite a number of Chicago paper trade executives are planning to make the June 18 and 19 trip. This year's program will combine business and pleasure

with the annual golf outing as a big feature but with the appearance of OPA, OCR and WPB headliners as indication that 1943 means business before pleasure. Included among the speakers will be paper's own Charles W. Boyce of the War Production Board.

A Threat to the Paper Industry

An imminent threat to the operations of the paper and the box board industries is contained in the announcement of the corn refining industry that because of diminishing corn supplies it may become necessary within a month to shut down the dozen or more plants now producing starch, dextrins, and other products of corn.

Paper manufacturers and box board makers, it is well known, are large and continuous users of starches and dextrins, employing these products in all divisions of these industries.

The cause of the situation is the almost complete stoppage of corn shipments to the terminal markets of the country, which means, of course, that the corn refiners are unable to buy the chief raw material used in their operations.

Nothing like this has ever happened in the 50 years' history of the industry, and is the unexpected result of the corn-hog policies initiated by the Secretary of Agriculture some time ago, current weather conditions being only a minor incident in the situation.

In an effort to stimulate livestock production, high selling prices were guaranteed for hogs, and price ceilings were set on corn with the result that the farmers of the corn belt plunged on swine production, the marketing of corn in the form of pork proving highly profitable. Accordingly, the swine census is now almost double the figures of normal years—and there is little or no corn for other corn users.

In this connection it should be noted that the corn refiners are using only a small fraction of the corn crop, that is, some 130 million bushels of the three billion bushel crop of 1943.

Since those industries using starch, sugars, syrup and other products of corn refining are heavily engaged in handling war orders, it is believed that the Washington authorities must recognize the emergency that is developing, change certain of their policies and thus avert what may rapidly become an industrial crisis.

Appoint Paper Cup Committee

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 14, 1943—WPB has announced the following Paper Cup Industry Advisory Committee with Eugene R. Van Meter as Government presiding officer. The members of the committee include the following: R. L. Allison, Logan Drinking Cup Company, Springfield, Mass.; Elbert Beeman, Cupples-Hesse Corporation, St. Louis, Mo.; Walter J. Bergman, Lily-Tulip Cup Corporation, New York, N. Y.; Walter J. Hamlin, Universal Paper Products Company, Chicago, Ill.; Leo J. Hulseman, Paper Containers Manufacturing Company, Chicago, Ill.; E. S. Lancaster, The American Paper Goods Company, Kensington, Conn.; Clifford J. Marshall, Mono Service Company, Newark, N. J.; J. E. McGiffert, Dixie Cup Company, Easton, Pa.; Rudolph Herz, Herz Cup Company, New York, N. Y.

To Carry Out Newsprint Commitment

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 16, 1943—Representatives of the Printing and Publishing Division of the War Production Board reported to directors of the American Newspaper Publishers Association at the Biltmore Hotel in New York the results of their conference with officials of the Canadian Wartime Prices and Trade Board in New York.

They stated that Canadian representatives confirmed that Canada's commitment to supply newsprint to United States publishers at the rate of 210,000 tons per month to the end of the third quarter, 1943, will be carried out. The rate of supply thereafter will be determined in consultation with WPB authorities as soon as circumstances permit a clear estimate of the next wood harvest. With this in view, United States and Canadian representatives have agreed to meet again late in July.

The provision of 210,000 tons monthly was predicated upon the expectation that Limitation Order L-240 would reduce the consumption of newsprint by about 10 percent. Meanwhile, however, orders received from United States publishers by Canadian mills are substantially exceeding the agreed supply. In June they amounted to more than 240,000 tons. To balance orders with supply under the commitment, the Canadian Newsprint Administration therefore found it necessary to direct manufacturers to apply a general reduction of 12 percent.

The excess orders by United States publishers were caused by the fact that Order L-240 restricts only the amount of paper which can be put into process. The only limitation on the amount of newsprint to be purchased is Order M-241 which provides that a publisher cannot have more than a 75-day inventory. Actually as of April 30, the average United States publisher's inventory was a 52-day supply of newsprint, and it is expected that when the May figures are available, this amount probably will be reduced to a 48-day supply. It is this spread between actual and permitted inventories which caused the excess of orders over supply.

The problem resulting from this situation was explained by the Canadian representatives, and was accordingly taken up. A solution will be sought in consultation with the American Newspaper Publishers Industry Advisory Committee in Washington in the near future.

The meeting was also concerned with the increasingly critical supply of pulpwood. It was explained the problem is shortage of manpower in the woods. Although last season's cut of wood for Canadian pulp and paper mills was better than anticipated, it was a million cords below the current rate of consumption. A similar situation exists throughout the United States, it was reported. Every effort is being made to stimulate the production of more wood in both countries.

The Newspaper Industry Advisory Committee will be consulted with respect to the necessity for future additional cuts in consumption.

Representatives of the Printing and Publishing Division who attended the New York meeting today included Harry M. Bitner, director; William G. Chandler, consultant and former director of the division; M. G. Sullivan, Chief of the Newspaper Section, and Sidney Freidberg, counsel of the Division.

Higher Newsprint Price is Being Discussed

Canadian Manufacturers Point Out That Lower Production and Higher Pulpwood and Transportation Costs Justifies Another Price Raise—Improvement of Hearst Financial Position Attracts Interest.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., June 14, 1943—Two things stand out as possible explanations of the recent flurry of interest in the pulp and paper stocks. One is the knowledge that negotiations are under way looking towards another boost in the price of newsprint and the other is the improved financial position of the William Randolph Hearst newspaper chain, which is indebted to Canadian newsprint manufacturers to the extent of eight to ten millions of dollars.

It is known that Canadian newsprint manufacturers have been far from satisfied with the $4 a ton rise allowed them in March and that they have continued their efforts to secure a further advance in the price. At the time the $4 boost was given, they had been hoping for $8 or $10 more per ton of newsprint, to compensate them for the advances in costs since the beginning of 1938. Lately, manufacturers have been growing more and more insistent that they must have a better price. Within the last couple of weeks discussions have moved ahead very rapidly and a further upward adjustment in the price schedule is now regarded as a definite possibility.

Have Lowered Scale of Operations

Manufacturers point out that government restrictions on consumption of paper have lowered the scale of operations, increased production and administration costs per ton of paper produced. Wood costs have advanced sharply and the new wood which is now going into newsprint adds appreciably to costs. Labor and transportation costs are higher.

It is also pointed out that on the basis of 1939 returns, on which the Federal tax authorities adjudged the industry as "depressed" for tax purposes, the industry as a whole was in the red $9 millions on an annual basis after making provision for depreciation, interest charges and deferred dividends, but before any return on equity. Since then the deficit has become $10 millions on the same basis.

Newsprint Mills Reported Losing

The average Canadian manufacturer is said to be losing $3 a ton or more at present on the basis of the new wood coming into use, after providing for full depreciation and debt charges. At a time when demand permitted the industry to operate at a higher rate of capacity, with resultant maximum efficiency, it was not so hard pressed. The peak was reached in 1941 with an output of 3,425,000 tons and sales of 3,454,663 tons. Last year sales dropped 246,000 tons and production about the same amount. The squeeze is definitely on the industry this year, it is claimed. For the first four months of 1943 production dropped 19.9% and sales 15.7%.

According to newspaper operators there is no prospect of increasing production this year. In fact, it is not unlikely that a decrease may take place, especially if the wood situation does not come up to expectations.

Newsprint makers claim that the lower scale of operations this year alone has resulted in almost completely wiping out any benefits which might have resulted from the March advance of $4 a ton.

Prospects for an upward revision are receiving more serious attention from investors, as reflected in the market trend.

Improvement of Hearst Interests Watched

Canadian newsprint manufacturers, and, presumably, investors, as well, are watching with keen interest the substantial improvement in the financial position of the Hearst chain of papers in the United States. For five years they have been carrying among their doubtful accounts some 8.5 millions of Hearst notes, given to them at a time when Hearst was unable to pay cash for his paper supply.

In the interval newsprint manufacturers have been receiving 5% annually on the debt, but prospects of its redemption were such that the majority of creditors took the notes out of current accounts and put them among deferred assets. The auditors went even further by appending a note to the balance sheet to the effect that they were not "in a position to express an opinion as to the ultimate value of this asset."

At present the Hearst publications owe Canadian newsprint companies about $10.5 millions, of which $2 millions is on open account and the balance represented by notes. These notes are secured by certain indentures on pledges on various Hearst assets. In some cases the notes rank ahead of bank claims.

Several Mills Hold Hearst Notes

It is said that ten Canadian newsprint manufacturers are interested in the improvement of the Hearst financial position. Probably the largest holder of Hearst notes is Anglo-Canadian Pulp and Paper Mills. Abitibi ranks next in order, followed by Consolidated Paper, Canadian International Paper and Lake St. John Power and Paper. Each of these companies holds at least a million dollars worth of the notes.

In Another Group

In another group are Donnacona Paper Company, Price Bros. Co., James Maclaren Co., St. Lawrence Paper Mills and Brompton, with average holdings of something less than a half million dollars of notes.

All these operators carry, in addition, open accounts, with the Hearst interests, representing current shipments, which are paid for in cash under the usual trade terms.

Whatever the ultimate value of the Hearst notes, current prospects seem to be that in any settlement a substantial cash payment will be made, while the balance owing might be used for bargaining purposes in negotiating long-term contracts. This expectancy of a substantial cash payment, at the worst, seems also to be reflected in the recent interest in the pulp and paper stocks.

Reports on Albemarle Explosion

RICHMOND, Va., June 14, 1943—John Hopkins Hall, Commissioner of Labor, listed six "probable causes" for the explosion at the Albemarle Paper Company in his report on the accident which occurred with fatal results to nine persons April 20.

It was impossible to determine the exact cause, Mr. Hall indicated, because all persons working on or around the 20-year-old digester were killed.

Mr. Hall's digest of the report does not set forth any specific beliefs as to the cause, but suggests that a proper inspection law might have detected the probable causes in time for such defects as might have been found to be corrected.

The results of the investigation made by the Department of Public Safety of Richmond and submitted to Mayor Ambler were withheld from publication on the grounds that it was confidential.

Mr. Hall's report was made in the form of a letter to Governor Darden. The text follows:

"This is a digest of report covering investigation of the steam explosion of the Hollywood plant of the Albemarle Paper Company, which occurred April 20, 1943.

"The investigation was made by Special Investigator G. H. Rich and Factory Inspector Milton W. Clark, of the State Department of Labor and Industry, in co-operation with the Department of Public Safety of Richmond and other interested agencies.

"A most thorough and comprehensive investigation and report was made, the details of which are all on file in this office.

"The explosion occurred in connection with a wrought iron rotary digester or steam pressure cooker approximately seven feet in diameter and 24 feet long, metal one-half-inch thick with double rivet loop, which has been in service for over 20 years.

"The explosion completely wrecked the building housing the digester and the digester itself was propelled some 45 feet away and imbedded into the second story of the adjoining concrete building.

"This unfortunate explosion has thus far resulted in the death of nine persons and injury to 19 others.

"As there is no State boiler code or inspection law in effect in Virginia, there exists no statutory standards comparable to the A.S.M.E. Code under which any inherent weakness of the vessel might have been determined. Likewise as no operators' license law exists there is no measure to determine the qualification of those in charge of this particular operation.

"The explosion covered a wide area and the injured who survived were not working in connection with the digester. Had the explosion occurred at another hour many others might have been killed and injured.

"As is frequently the case when such disasters occur, all persons working on or around the digester, which exploded, are dead and with them went the only source from which the probable cause of this accident might be determined.

"The explosion may have been caused by one or more factors, namely:

"1. Excessive pressure beyond the safe working of the digester.

"2. Failure of steam pressure gauge to register the correct reading.

"3. Failure of safety valves to properly open or seat.

"4. Deterioration of metal caused by age.

"5. Corrosion of metal caused by the chemicals used.

"6. Operation of mechanism by someone not qualified.

"These various probable causes might have been detected and the defect corrected had a proper boiler inspection and license law been in effect in Virginia, such as exists in the surrounding States.

"Knowing of your sympathetic interest in this humane and constructive safety legislation and your announced determination to recommend proper legislation to the next General Assembly, I wish to assure you of the whole-hearted co-operation and support of the Department of Labor and Industry, and to state that we are accumulating data on the subject and preparing a tentative draft of a bill which will be available to you in connection with any measure you may wish to submit to the General Assembly."

Award Service Pins at Carthage

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., June 14—The annual awarding of service pins to the employees of the National Paper Products Company was held at a luncheon here last week at which J. D. Zellerbach, president of the Crown Zellerbach Corporation, stated there was still unnecessary use of paper and that in view of the shortage of pulp some paper products would be reduced and others discontinued. Citing phases of industry undertaken by the corporation to further the war effort, the speaker told of one of their managers assuming the charge of a charcoal plant, the activated charcoal to be used in the manufacture of gas masks. The corporation is glad to make these contributions to the war effort although all these things are done at our cost, he stated. He also said that two plants were turning their spruce over to be used in the manufacture of training planes and PT boats. Other contributions have been given in the way of personnel. Two vice presidents of the corporation are serving in government positions.

Briefly tracing the origin of the service pins, the president told of the small beginning as a paper wholesale business that was made by his grandfather in 1878 and a few years later the small operating unit was established. Now grown to the second largest pulp and paper industry on this continent and possibly in the world, with some 8,000 people in the organization, the plan of service pins was devised as growth occurred in order to keep in touch with the various units of the organization.

Hawes Mfg. Co. Incorporates

[FROM OUR REGULAR CORRESPONDENT]

CLAYTON, N. Y., June 7, 1943—Announcement is made of the incorporation of the Hawes Manufacturing Company and articles were filed this week with the county clerk. The charter is perpetual and provides a capitalization of 100 no par value shares and a directorate of three members. The company is authorized to buy, sell, deal in paper, manufacture paper products. The incorporators are Ned Hawes, May E. Hawes and Katherine B. Hawes, all of Clayton. They are also the directors until the first annual meeting.

Prices Fixed on Newsprint Items

WASHINGTON, D. C., June 10, 1943—Newsprint produced in other than standard non-dutiable sizes was given specific dollars-and-cents ceilings by the Office of Price Administration today.

Previously under the General Maximum Price Regulation, these types of newsprint paper are now brought under Revised Maximum Price Regulation No. 130 (Standard Newsprint Paper) by Amendment No. 3, effective June 14, 1943.

The new maximum prices for these items will be based upon the manufacturer's roll price for standard newsprint of $55 per ton in the base zone, identified as Zone 4 in the Regulation, and comprising states around the Great Lakes. The differentials allowed by the regulation may be applied to this price. Standard newsprint was advanced to $55 March 1, 1943, from the $51 base price which had applied for over five years.

The non-standard sizes represent less than one per cent of the total annual consumption of newsprint paper in the United States. It was believed, however, that unless standard newsprint pricing was applied to these items, the greater part of which are "side-run news," manufacturers would be inclined to dispose of them as a substitute for woodpulp, since this would ensure a larger financial return. If these items are not available as newsprint, printers and merchants would have to resort to higher priced types of paper. For these reasons, today's action is in conformity with the President's recent "hold-the-line" order.

The non-standard sizes, which are dutiable, are largely imported from Canada. Heretofore, the duty has been paid by the Canadian producer, and this practice is continued by the new pricing provision.

Examples of these non-standard sizes are: Rolls narrower than sixteen inches in width, used in the manufacture of tablets and sales books and to some extent in special newspaper supplements; counter rolls and sheets, used as cheap retail wrapping paper; and small sizes of sheeted newsprint, used for various commercial printing purposes.

Several other changes are effected by the same amendment. They are:

1. The weight definition for super-standard quality of standard newsprint is removed, thus permitting any of the standard newsprint weights of this quality to be priced under this Regulation. Previously, super-standard newsprint was made almost entirely in the thirty-four pound weight. Now, to encourage its production in lighter basis weights and thus conserve pulp supplies, the differential may be applied to any standard newsprint weight.

2. The merchant's base for mark-ups is redefined to enable merchants to follow their standard practice in coordinating their prices with those of the manufacturer. Formerly, merchants selling standard newsprint could reflect only their actual costs plus the permitted mark-ups. Now, mark-ups will be based upon the manufacturer's current pricing, in accordance with trade customs.

3. New definitions are adopted for "manufacturer" and for "merchant," to permit a manufacturer or sales subsidiary to quality as a merchant in the rare instances where he performs the functions of a merchant and can demonstrate this practice to the satisfaction of OPA.

4. The adjustable pricing clause is changed to the uniform provision being adopted for all regulations, and permits contracts to be made under certain limited circumstances which provide for a subsequent adjustment in prices to those approved by the Office of Price Administration.

5. The "sale for export" provision is restated so that it supersedes the provisions of the Second Revised Maximum Export Price Regulation and controls domestic sales of newsprint destined for subsequent export.

Casein Suppliers Must File Forms

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 16, 1943—Suppliers of casein are required to file with the War Production Board separate Forms PD-601 for proposed deliveries to each type of customer as a result of the issuance by WPB of Preference Order M-307 as amended. For the purposes of this requirement, the classes of primary products are listed as adhesives, coated paper (except wallpaper), gypsum, insecticides, leather finishes, plastics, rubber, wallpaper, other products (specify), resale (as casein) or inventory (as casein).

The amended order provides that a supplier prepare an original and three copies of each set of Form PD-601 and forward the original and two copies to the Chemicals Division, WPB, retaining a third copy for his files. Customers will continue to apply on Form PD-600 for authorization to accept delivery or to use casein in any calendar quarter.

Detailed instructions to applicants for filling out the tables on Form PD-600 are contained in the amended order.

Utah Will Have Excelsior Mill

CEDAR CITY, Utah, June 14, 1943—Negotiations are complete for establishment here of an excelsior mill by the Los Angeles Paper & Excelsior Company of Los Angeles, Cal., according to Albert Albertson, Dixie national forest supervisor, who has contracted to supply timber.

Announcement of the new industry was made by D. B. Roesner of Los Angeles after preliminary negotiations for timber purchases were completed.

The plant will use from 500 to 1000 cords of aspen timber annually and will employ from 12 to 15 persons locally.

Mr. Albertson said aspen of excellent quality is sufficient on the forest areas near here to supply a plant of this size for a number of years. The Sevier division of the Dixie forest has a stand of more than 1000 acres of aspen which might be used in the operation.

Parsons & Whittemore Changes

Clarence W. Hatch has resigned as secretary-treasurer of Parsons & Whittemore Inc., 10 East 40th street, New York, after thirty years of service. Mr. Hatch started with the company in 1914 as an assistant auditor and shortly thereafter became auditor. Subsequently he was promoted to assistant secretary-treasurer and later to the position that he held at the time of his resignaion. Mr. Hatch will remain a director of the company.

Mr. Eli de Vries, president of the company, continues in this capacity and has assumed the additional office of treasurer.

William L. Kauffman has been elected secretary and assistant treasurer.

R. F. Kohs Honored at Banquet

Robert F. Kohs, general superintendent of Detroit Sulphite Pulp & Paper Company, was guest of honor at a golden anniversary banquet given for him by the Company at Dearborn Inn, Dearborn, Mich. on June 5. The occasion was the celebration of his fifty years' association with Detroit Sulphite.

Attended by executives and other members of the organization, the dinner was also notable for the fact that over half of the guests were employees who had been with the company for more than twenty years, three for over forty years.

Mr. Kohs, or "Sandy" as he is well known to his many friends in the trade, started to work at Detroit Sulphite before the company was ten years old and when he was only fourteen. Starting at the bottom he made rapid progress and was a machine tender

BANQUET TO ROBERT F. KOHS

at the early age of nineteen. From there on he earned steady promotion through the years, first to paper machine night boss, then successively paper machine foreman, paper mill superintendent, and in 1936 general superintendent of the plant.

Talks were made by Harold R. Telfer, president of the company, Lawrence Hulbert, treasurer, John H. Behnke, secretary, and other associates of the guest of honor. Not only was Mr. Kohs' long length of service pointed out, but also his remarkable record of progress since starting with the Company as a young boy. He has the distinction of being the first employee of Detroit Sulphite to have attained fifty years of service with the company.

Pulpwood Available in Gabon

Wood suitable for the manufacture of paper is available in large quantities in the forests of the Gabon in French Equatorial Africa, according to a report to the Department of Commerce.

The Parasol Tree is the most easily available source. It grows rapidly in the logged-off areas where lumber operations have taken place. Trees now available for cutting measure from four to twelve inches in diameter. The trees could be felled, cut into short lengths by the natives, and transported to Libreville or Port Gentil, Gabon, by means of the facilities already available for handling logs and lumber. Collection of the wood could be begun with little difficulty and on short notice. If large quantities were desired, however, it would be advantageous to send from the United States portable power saws for cutting the logs into short lengths.

Change Order for Shipping Sacks

WASHINGTON, D. C., June 16, 1943—Paper shipping sacks for packing foods, plaster, seeds and other specified products now are controlled by Limitation Order L-279, issued each week by the War Production Board, instead of Order M-221.

The restrictions under L-279 are the same as those previously imposed by M-221, except that the 3-pound sack for sugar is no longer permitted. M-221, also amended today, previously covered these restrictions in both textile and on paper shipping sacks. Corresponding restrictions on textile bags are still retained in M-221, except that the 3-pound textile bag for sugar is no longer permitted.

This move was taken to separate the paper shipping sacks from the textile bags in anticipation of the establishment of specifications and other restrictions for paper shipping sacks. A study of paper quality requirements was recently completed by a group of technicians from the paper sack industry collaborating with the U. S. Bureau of Standards. The results of the study are being considered by the Containers Division, WPB.

Under L-279, manufacturers, processers or packers of certain products may pack their products only in specified bag sizes. The products are: beans, cement (standard portland), flour (milled wheat), meal, plaster (gypsum) potatoes, processed feed (mixed, mill), rice, salt, seeds, starch, and sugar.

The order covers any single-wall, duplex, or multiwall paper sack designed for use as a primary container for packing a particular commodity for storage or shipment, but does not cover a container shipping sack for combining a number of packages of a particular commodity in a single unit, or an overslip sack for covering a single package of a particular commodity for shipment. Neither does it include sacks designed as liners for outer containers, combination textile-paper bags (bags made of textile laminated with paper), grocers variety bags, and bags made wholly from cellophane, glassine, parchment, or waxed paper.

A. U. Claghorn to Head Western Div.

Arthur U. Claghorn, president of the Pioneer Paper Stock Company, Chicago, has been appointed chairman of the Western Division of the National Association of Waste Material Dealers, Inc., and Morton A. Friedman, son of Ben Friedman has been appointed secretary.

The Western Division is planning on holding a dinner-meeting in the Louis XVI Room, Hotel Sherman, Chicago, on the evening of Thursday, June 24. As this is the date of the Thirtieth Anniversary of the first regular meeting of N.A.W.M.D. held after the formation of the organization and as the waste paper trade committee is holding an open meeting in Chicago on the following day, it is anticipated that the dinner meeting on the 24th will be very largely attended by visiting members and non-members from various sections of the country.

The dinner is scheduled for 6:30 and an interesting program is being planned. One feature of the program will be an address by Max Gene Nohl on the subject "Salvaging Sunken Ships" and this address will be illustrated by natural color movies.

Reservations can be made through the secretary, Mr. Friedman, by addressing him Box 27, Hammond, Ind.

Newsprint Supply Dwindling Rapidly

BOSTON, Mass., June 15, 1943—A prediction that a drastic curtailment in newsprint use might be forced upon American newspapers before the end of this year was made today by Warren Morgan, assistant to the associate director of the labor production division of the War Production Board, in an address before the convention of the American Newspaper Guild.

"The newsprint supply is dwindling and dwindling rapidly," he said. "The outlook is none too good."

He asserted that the previously estimated newsprint requirements for 1943 was 3,536,796 tons, but that the estimated production would be only 3,470,000 tons. At the present rate of consumption about 3,700,000 tons would be used, considerably exceeding both the requirement and supply estimates.

The newspaper publishers were allowed to use 100 per cent of the 1941 net paid circulation, which he figured would amount to a 10 per cent curtailment in the use of newsprint. However, about 400 newspapers had appealed to the WPB for permission to use more paper than was allowed under the ruling. In almost all cases permission was granted.

Production of newsprint was falling off considerably, partly because some Quebec mills had gone out of business and partly because of the labor situation.

Mr. Morgan suggested that the Guild formulate a policy on its position in the newsprint situation, aimed toward an orderly curtailment intended to save the industry from some more drastic regulation.

To Standardize Paper Cup Sizes

WASHINGTON, D. C., June 16, 1943—A task group to study the possibility of standardizing and simplifying paper cup sizes and packaging methods was appointed at a meeting of the Paper Cup Industry Advisory Committee and WPB officials in Washington recently.

The purpose of the study is to determine possible methods of conservation in the manufacture of paper cups to relieve the shortage of raw materials.

The committee also proposed that control over the distribution of paper cups be imposed to make sure that such cups will be channeled to the most essential uses.

The committee said that the paper cup industry now is working at maximum capacity, but is unable to meet the demands for its products because of inability to obtain additional raw materials, labor or equipment.

R. D. Martin Wins Commission

Roger Dean Martin of Neenah, Wis., who has been in the engineering department of Kimberly-Clark Corporation for the last four years, has been commissioned as a lieutenant in the United States Army. He will report to Fort Monmouth, N. J., June 4.

B. C. Plants 25 Million Trees

British Columbia's forest service has added 8,000,000 trees to the future stock of the province this year, making a total of more than 25,000,000 trees planted since 1940, Hon. A. Wells Gray, minister of lands, announces.

Name Envelope Advisory Committee

WASHINGTON, D. C., June 16, 1943—WPB has announced a new Specialty and Hand Made Bag and Envelope Industry Advisory Committee with Karl Karlson as Government Presiding Officer. The members of the committee are: W. L. S. Alexander, Arkell & Smiths, New York, New York; Alfred Bleyer, Alfred Bleyer & Co., Brooklyn, New York; William C. Cary, U. S. Envelope Company, Springfield, Mass.; A. B. Collins, James River Division, Benj. C. Betner Company, Richmond, Va.; W. L. Droege, Moser Bag and Paper Company, Cleveland, Ohio; Gordon H. Friend, Thomas M. Royal & Co., Philadelphia, Pa.; A. A. Heller, Alexander Herz Company, Inc., New York, N. Y.; Fred W. Kennedy, Kennedy Car Liner and Bag Company, Inc., Shelbyville, Ind.; Louis Kimple, Dixie Wax Paper Company, Dallas, Tex.; E. S. Lancaster, the American Paper Goods Company, Kensington, Conn.; W. L. Moore, Shellmar Products Company, Mt. Vernon, Ohio; J. W. Noonan, the Dobeckmun Company, Cleveland, Ohio; J. Louis Reynolds, Reynolds Metals Company, Inc., Richmond, Va.; Lloyds Riches, Western Paper Converting Company, Salem, Ore.; E. M. Rickel, Union Bag and Paper Corporation, New York, N. Y.; H. Kurt Vahle, Cupples-Hesse Corporation, St. Louis, Mo.; J. F. Zorn, Custom-Made Paper Bog Company, Inc., Long Island City, N. Y.; Irving Zucker, Oneida Paper Products, Inc., New York, N. Y.

Paper and Paper Product Sales Up

Paper and paper product sales were up 4 per cent this April compared with last, according to a Bureau of Census report just issued, based on a group of reporting firms' sales. Sales in April this year were 1 per cent under those of the preceding month, however. Inventories showed an 8 per cent decline this April compared with those of the same month a year earlier, and changed less than 0.5 between this April and this March.

Buys Taylor-Logan Papermaking Equipment

At the auction sale conducted recently at the former plant of the Taylor-Logan Company at the foot of Sargeant street, Holyoke, Mass., the J. J. Ross Company, dealers in used and rebuilt paper mill machinery, 250 Frelinghuysen avenue, Newark, N. J., purchased a considerable portion of the papermaking equipment, including the paper machine. In line with its usual policy, the J. J. Ross Company will offer the machinery it purchased for sale.

Heads Forestry Unit

Capt. John Larsen has been appointed officer commanding the training section of the Canadian Forestry Corps with the rank of major.

Maj. Larsen is a native of Sweden and speaks six languages, including English, French and German. He served in the armed forces of his native country before crossing over to Canada. He joined the Canadian army as a private. He is 38.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending June 12, 1943

STOCKS

	High	Low	Last
A. P. W.	2¼	2⅛	2¼
Armstrong Cork Co.	40¾	38½	39¾
Celotex Corp.	14⅜	13¾	14
Celotex Corp., pf.	90⅞	90½	90⅞
Certain-Teed Products Corp.	7⅜	6½	6½
Certain-Teed Products Corp., pf.	61¼	56⅛	56½
Champion Paper & Fibre Co.	22	22	22
Champion Paper & Fibre Co., pf.	108	107½	107½
Congoleum Nairn Co.	25	24¼	24¼
Container Corp. of America	23¾	22¾	22⅞
Continental-Diamond Fibre Co.	14¾	14	14
Crown-Zellerbach Co.	15⅝	15	15½
Crown-Zellerbach Co., pf.	95	93	93¾
Dixie Cup Co.	....	....	....
Dixie Cup Co., —A	42½	42	42½
Flintkote Co.	21⅞	20⅛	21
Flintkote Co., pf.	105	104	105
Robert Gair	3⅞	3¾	3⅞
Robert Gair, pf.	14	13⅝	13⅞
International Paper Co.	13¼	12⅛	12½
International Paper Co., pf.	59⅜	58½	58⅝
Johns-Manville Corp.	88	85	85¾
Johns-Manville Corp., pf.	132	131	131
Kimberly-Clark Corp.	31½	30½	31½
MacAndrews & Forbes	26⅛	25⅝	26⅛
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	41¾	40¾	40¾
Mead Corp.	10⅛	9⅝	9⅞
Mead Corp., pf. A—6%	82	82	82
Mead Corp., pf. B—5½%	73	70	73
Paraffine Companies, Inc.	45	43¾	45
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	14¾	14	14⅛
Rayonier, Inc., pf.	30	29¾	30
Ruberoid Co.	26½	25¾	25⅞
Scott Paper Co.	42¼	42	42⅛
Scott Paper Co., pf.	115	115	115
Sutherland Paper Co.	....	....	....
Union Bag & Paper Corp.	11¾	11⅛	11¼
United Paperboard Co.	5¾	5½	5½
U. S. Gypsum Co.	72⅛	70¾	71
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	15⅞	15⅜	15⅞
West Virginia Pulp & Paper Co., pf.	108⅛	106½	107¾

BONDS

Abitibi Pulp & Paper Co. 5s '53	74½	74½	74½
Celotex Corp. 4½s '47	101⅝	101¼	101⅝
Certain-Teed Products Corp. 5½s '48	100	99½	100
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	107	106¾	107
International Paper Co. 5s '47	104½	104¼	104½
Mead Corp. 3¼s '53	....	....	....
West Virginia Pulp & Paper Co. 3s '54	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending June 12, 1943

STOCKS

	High	Low	Last
American Box Board Co.	8	8	8
Brown Co., pf.	....	....	....
Great Northern Paper Co.	35	33¾	34¼
Hummel-Ross Fibre Corp.	4¾	4½	4½
National Container Corp.	12⅛	11¾	11¾
St. Regis Paper Co.	4	3⅞	3¾
St. Regis Paper Co., pf.	137	137	137
Taggart Corp.	5¼	5	5⅛

BONDS

American Writing Paper Co. 6s '61	92¾	92¾	92¾

Abitibi to Pay on Bonds

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., June 7, 1943—The judicial committee of the privy council has reserved judgment in the Abitibi Power and Paper Company, Ltd., appeal. It is expected that the judgment will be delivered next month. The appeal began May 27 and is a step in efforts to settle the affairs of the company which went into liquidation in 1932 and is from a judgment of the Ontario supreme court which upheld a lower court decision that the assets of the company should be sold at public auction to satisfy the claims of the bondholders.

Abitibi Power and Paper Company, Ltd., had net earnings in 1942 of $8.7 millions, compared with $10.1 millions in 1941 and $8.2 millions in 1940, it has been officially stated. These figures are before depreciation, bond interest and taxes. Depreciation was charged at $4.5 millions for 1942, the same amount as provided in the two preceding years.

It is understood that a complete annual report will be presented in the near future by G. T. Clarkson, receiver and manager.

Distribution of the third payment of $190 per $1,000 on bond principal requires that each bondholder present his bond on or after June 30, 1943, with all interest coupons attached, to the Montreal Trust Company, in Toronto, Montreal or London, England, or to the City Bank Farmers' Trust Company, New York. Instructions regarding names and addresses to which cheques are to be issued should accompany each bond, which will be stamped with the particulars of the payment and returned. Interest will accrue from June 30 on the balance owing after giving effect to the latest payment as well as the two previous ones.

Holders of certificates of deposit will receive payment by the Montreal Trust Company on direction of the Bondholders' Protective Committee, but will not be required to present their certificates of deposit. Transfer books for certificates of deposit will be closed from June 9 to July 2. The third payment requires $9.2 millions and brings total principal payments to $20.3 millions or $420 on each $1,000 bond.

Certain-teed Nets $119,236

The Certain-teed Products Corporation reports March quarter: Net profit, $119,236, equal to $1.77 a share on 67,373 shares of 6 per cent preferred stock, against $292,635, or $4 each on 73,069 shares of preferred stock, last year. For the first quarter of 1943 Sloane-Blabon Corporation, of which Certain-teed is a substantial stockholder, reported a net profit of $87,931, compared with $65,684 for the same quarter of 1942. In February, this year, a dividend of $17,697 was paid to Certain-teed Products by this company.

Carpenter Paper Co. Earns $575,227

The Carpenter Paper Company reports for 1942: Net income after $575,227 Federal income and excess profits taxes was $352,226, equal after preferred dividend requireemnts to $2.80 each on 109,819 common shares. Net income for 1941 after $413,784 taxes was $433,741, or $3.59 on 108,369 common shares. Net sales, $16,856,456, compared with $15,371,835.

A. C. Zimmerman Resigns

A. C. Zimmerman, vice president and general manager of the Pacific Paperboard Company, Longview, Wash., announces that he is no longer connected with that company having resigned June 1. Mr. Zimmerman's address is 1424 Kessler boulevard, Longview, Wash.

Instrumentation Studies XLV*

Penetration of Papers by Water Vapor Part. II.

An Electric Sword Hygrometer for Measuring the Relative Humidity of Air Inside Packages or other Enclosures

Abstract

To fill the need for the accurate testing of the state of dryness inside packages or other enclosures, an electric hygrometer which is satisfactory for this purpose has been developed. An essential feature of this hydrometer is its ability to withstand frequent contact with hard, dehydrated particles of food, and yet respond at a practicable rate of speed. The hygrometric element is a structural part of a sword or a lance, which can be driven easily into the package. Approximately two or three minutes after piercing a package, an accurate determination of the relative humidity of the air inside the package can be made. The instrument indicates a current which, through the use of calibration charts, provides a measurement of relative humidity. Details concerning the development of the method, the construction of the equipment, the calibration, and the operation of a portable instrument are given.

Several months ago the Q.M.C. Subsistence Research Laboratory of the Chicago Quartermaster Depot expressed the need for an instrument which could be used either in the laboratory or in the field for measuring the state of dryness of air inside packages or cartons containing dehydrated foods or other materials which must be kept in a dry condition. This report describes a device which has been developed to satisfy this need.

Some of the factors governing the choice of a method of measurement are:

1. Freedom from error caused by mechanical hysteresis and creep in a hygroexpansive element.
2. Freedom from error caused by hysteresis in the hygroscopic response of an element.
3. Speed of response of the moisture-sensitive device.
4. Ability of the device to withstand ordinary handling and mechanical shock.
5. Ability of the device to withstand contact with particles of food or other material, and brushing (cleansing).
6. Ability of the device to stand up in hot and humid weather.
7. Simplicity of both method of measurement and actual operation of the device.
8. Simplicity and accuracy of the means for calibrating the device in the field.

Conceivably, any of the many existing methods for measuring relative humidity could be used for the purposes at hand. One of the simplest means is that afforded by colored hygroscopic substances—e.g., particularly treated silica gel—which indicate relative humidity by their color. A test based upon such a substance is rather subjective and was considered insufficiently accurate. Many instruments employ a hygroexpansive material like cellophane, gold beater's skin, paper, and human hair. All of these substances exhibit mechanical hysteresis and creep, and virtually all undergo an appreciable hysteresis in hygroexpansivity. A properly extracted human hair is comparatively free of large error resulting from hysteresis of the latter type and is fairly satisfactory when used in a properly designed instrument. The chief difficulty in the use of a hair hygrometer arises in the necessity of shielding the hair from contact with the foods under test. A perforated sheath equipped with a moisture-pervious, continuous film must be employed, and equilibration with such a sheath is too slow to be considered practical. It would be possible to employ a circulating system (a method experimented upon in the present work) whereby the air would be pumped from a package, passed over or through a moisture-sensitive device, and then returned to the interior of the package. A circulating system suffers the drawback of being cumbrous, and is subject to errors because of the added volume of the system, small leaks, and slight amounts of moisture in the rubber tubing and pump. However, such a system enables the use of fundamental devices like the dew-point hygrometer; were it not for the inconvenience of use of a dew-point hygrometer, the accuracy of the dew-point method would argue strongly in favor of perfection of a circulating system.

In consideration of the various possible methods of measurement, it was decided that the electric hygrometer described by Dunmore *(1)*, working at the National Bureau of Standards, was best suited to the general requirements and would serve best as a basis for the present development.

* This report is one of a series issued as a part of the instrumentation program of the American Paper and Pulp Association. Part I of this particular series appeared in the Paper Trade Journal issues of April 8, and June 10, 1943.

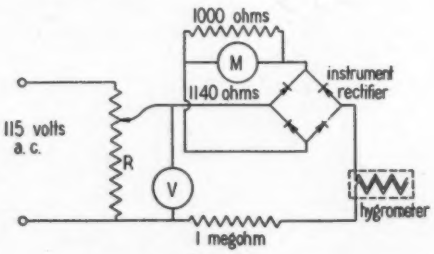


FIG. 1
Wiring Diagram for Electric Hygrometer

Development of the Method

The electric hygrometer developed by Dunmore is based upon the principle that the electrical conductivity of a film of partially hydrolyzed polyvinyl acetate (PVA), containing a small amount of lithium chloride, depends markedly and reproducibly upon the relative humidity of the air with which it is in equilibrium. The PVA film exists on a small cylinder, which had previously been coated with polystyrene (an excellent insulator) and wound in bifilar fashion with a single layer of two fine palladium wires. The bifilar winding is shown schematically in Fig. 1, which presents a wiring diagram for an electric hygrometer. Data concerning recommended dimensions, turns per inch of the winding, and means for preparing the films of polystyrene and PVA are given in detail by Dunmore *(1)*. Changes in conductivity are noted by changes in the current indicated by a d.c.

microammeter *(M)*, which is connected into the a.c. circuit, as shown, through a full-wave metal oxide instrument rectifier. The voltage impressed is maintained at a pre-determined value by means of the voltmeter *(V)* and potentiometer rheostat *(R)*.

The idea from which the present work started was that of making the cylindrical hygrometric element a mechanical part of the sword, which would consist of a sttel point and handle, with the element intervening between. Because the external layers of the element are easily damaged by contact with objects, it was necessary to provide a guard. A perforated sheath was first considered. Finely divided materials would enter the perforations and possibly foul the element; a further objection to the use of a perforated sheath alone is that it does not provide protection from accidental contact when the sword is disassembled for cleaning. It was hoped that a moisture-pervious film, such as uncoated cellophane or paper, could be placed inside the sheath and thus make it unnecessary to disassemble the device for cleaning. Experiments with such films showed that the time for equilibration of the element with new ambient conditions was much too long to be practicable, even when uncoated cellophane was wrapped snugly around the element itself.

Experiments were next carried out with thin layers of hard, abrasive, porous materials. These layers or films were formed upon the external surface of the element itself. Among the materials tried were Insalute cement, dental cement, Portland cement, and alundum. A fair measure of success was secured in earlier experiments with Insalute and Portland cement, but these layers were alkaline and the elements exhibited somewhat erratic behavior. Very good results were obtained with dry alundum powder, and nearly all elements made up with a layer of this very abrasive material have proved successful. The currently employed procedure for forming the alundum film on an element is included in the following method of preparation of the element.

The machine steel tube, which serves as a base for the element and also as a structural element of the sword (Fig. 2), is coated with polystyrene, wound with palladium wire, and coated with PVA containing the desired amount of lithium chloride in a manner very closely following the procedure recommended by Dunmore *(1)*. After the PVA film has been permitted to dry thoroughly over a period of a few hours, the element is quickly dipped in the PVA solution and coated with alundum powder by shaking the element in a suitable bottle containing a few grams of the dry powder, as follows. The final dipping is made with the element attached to the handle of the sword. A one-hole rubber stopper is carefully slipped over the element and pushed in place over the hilt. The element is then introduced into the bottle containing the alundum, the rubber stopper is pushed firmly into the mouth of the bottle and, with the bottle held in a horizontal position, the whole assembly is vigorously shaken up and down. The bottle is slowly rotated during this shaking. The adhering film of alundum powder (remaining after blowing off any loosely held excess) is sufficiently thin to show the contours of the turns of fine palladium wire. After a drying period of about 12 hours, the element is *lightly* sprayed with a 5:1 dilution of the PVA-lithium chloride solution. Only an amount of PVA sufficient to bind the particles of alundum together is used in this final treatment; an excessive spraying of the element reduces the porosity of the protective layer and results in a unit of slow response.

The ends of an element are protected by wrapping strong cotton thread about each end, forming bands about ⅜ inch wide. These bands do not overlap the sensitive portion, and provide surfaces which can be handled. They are made hard and durable by painting with an alcoholic solution of shellac.

The alundum surface of an element is very durable against brushing with a camel's-hair brush, or loose contact with small, hard food particles. Although the individual particles of the alundum are extremely hard, the film can be damaged by pressing against objects, such as dehydrated sliced potatoes, the individual pieces of which are surprisingly hard and sharp. The film is protected from disruption by pieces of foodstuffs by means of a coarse, cylindrical screen. Food particles which pass in and out of this guard can do no harm to the element.

The speed of response of an element to a change in relative humidity is greatly reduced by the layer of alundum. However, this statement is relative, and

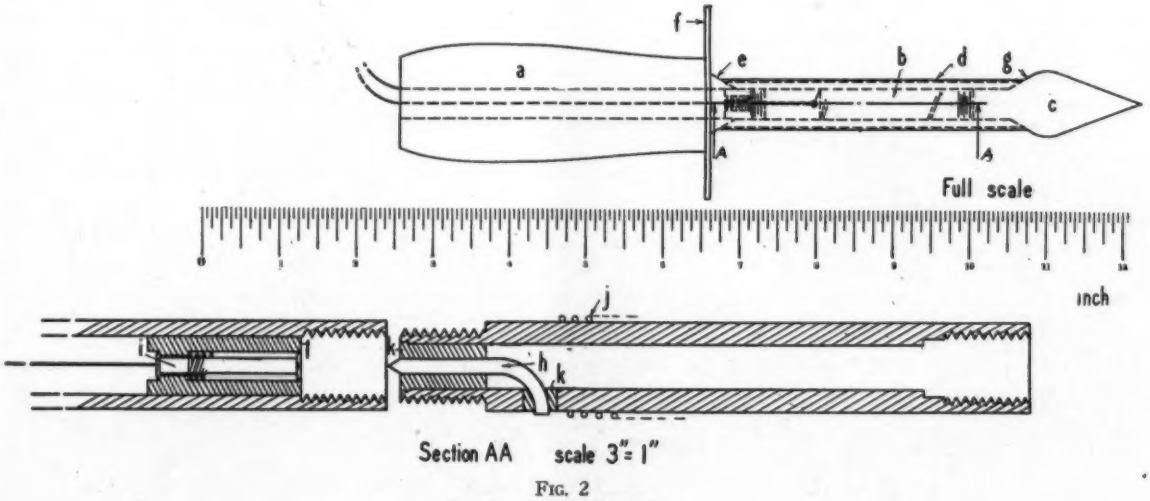


FIG. 2
Sword-type Electric Hygrometer

the actual response of a coated element is fast as compared with many hygrometric devices.

The Sword Hygrometer and Its Calibration

A detailed drawing of the sword hygrometer is presented in Fig. 2. The main structural parts were machined from steel shafting or pipe.

Earlier models of the sword hygrometer consisted of a main shaft, about which the bifilar coil was wound, and a detachable point. Thus a hygrometer was limited in its use to a narrow range in relative humidity, and was thrown completely out of possible use when the element was damaged. An attempt was made to cover a broader range in relative humidity through the use of more than one coil *(1)*, but difficulties were encountered with the electrical connections to the coils. The present design (Fig. 2) was evolved in consideration of the earlier difficulties. First, it will be seen that the sword can be readily disassembled, and the element easily changed. (Several elements containing different concentrations of lithium chloride in the PVA film can be made to cover a wide range in relative humidity.) Second, the electrical connections to the bifilar coil have been made almost indestructible, and are automatically established when an element is screwed into place. One of the wires connects to the steel body of the sword. The other wire is anchored on a pointed, insulated metal member *(h)*. This latter member engages a spring-actuated contact in the handle in a manner similar to the contact of a single-contact automotive lamp in its socket.

Laboratory tests and calibrations were performed with the system shown in Fig. 3, which was comprised of a recirculating pump, a dew-point hygrometer, and humidifier employing a saturated salt solution *(2)*. If a small natural leak does not exist at the periphery of the pump, a small outlet must be provided on the high pressure side of the pump. The element of the sword is inserted into the test bottle, as shown, and meter readings are noted from time to

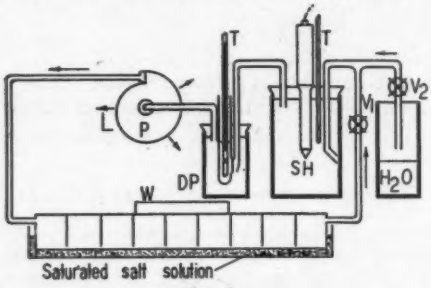


FIG. 3

Calibrating System for Sword Hygrometer

P	—Centrifugal air pump
SH	—Sword hygrometer
V_1 and V_2	—Valves
T	—Thermometer
D.P.	—Dew-point apparatus
W	—Weight
L	—Small leak

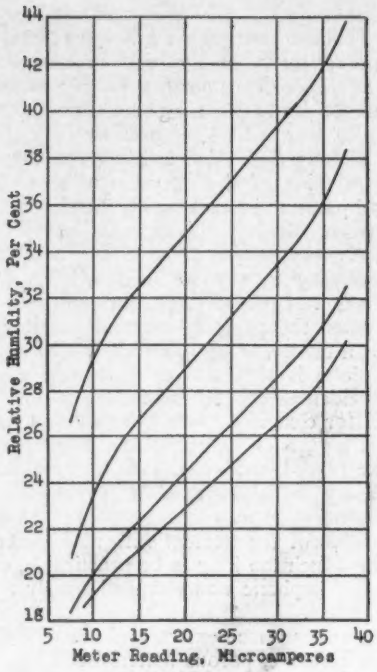


FIG. 4

Calibration Curves for Electrical Hygrometer Units

time. When the meter reading and dew points are constant, the former and the computed relative humidity are entered in the tabulation of calibration data. The dry-bulb temperature is also recorded, since the instrumental response is a slow function of the temperature. If it is desired to make a small change in relative humidity, the rate of entry of humid air to the system is adjusted by valves V_1 and V_2.

Calibration data for some of the successful alundum-coated elements thus far made in the laboratory are presented for two temperatures in Table I. The data for room temperature are given in graphical form in Fig. 4. The characteristic shape of the family of curves should be noted. The uniformity of this shape makes it possible to obtain the whole working range of an element by noting the temperature and the equilibrium current at a single, known relative humidity. This has been found true for all elements investigated thus far, even after a long aging period during which the calibration changed appreciably. This fact is very valuable in the accurate checking and use of the sword hygrometer in the field, where, as is described later, calibration can be checked with a saturated salt solution, such as that of potassium acetate.

The data obtained at different temperatures indicate that the relative humidity corresponding to a given current reading decreases about 0.21% R.H. per °C.

TABLE I.—CALIBRATION DATA FOR ALUNDUM-COATED ELEMENTS

Element No. E, 37.7° C.		Element No. E, 23.5° C.		Element No. G, 23.2° C.		Element No. H, 23.2° C.		Element No. I, 24.7° C.	
R.H. %	Meter Reading	R.H. %	Meter Reading	R.H. %	Meter Reading	R.H. %	Meter Reading	R.H. %	Meter Reading
14.4	5.2	16.4	5.9	25.6	7.0	17.0	6.0	19.0	9.8
20.6	7.3	20.1	9.1	29.4	10.0	20.9	11.0	20.6	13.4
23.4	10.3	23.4	13.3	35.2	20.8	22.1	14.8	24.5	25.2
26.2	14.0	26.5	21.9	38.8	29.0	24.8	22.0	25.7	27.5
29.0	19.5	30.8	32.8	42.8	35.8	29.0	31.0	26.3	29.9
32.1	27.5	32.0	33.9	47.4	40.0	30.9	35.8	...	...
34.6	32.8	35.0	37.3	...	...	37.8	40.5	...	...
40.0	38.6	38.3	39.8	...	...	...	...	...	...
46.7	42.0	...	...	...	...	...	...	...	...

rise, or about 0.12% R.H. per °F. In actual use the operator must subtract 0.21% R.H. for each °C. above the temperature at which the calibration curve was established. It is possible that increased ionic conductivity is partly compensated by decreased moisture content of the PVA-lithium chloride film.)

(To be concluded)

Urged To Protect Forests

"Because war has brought many new demands for wood and a more vivid realization that wood is a vital resource of national defense, foresters are urging wiser use of the forest now and during the period of rehabilitation after the war", says the New York State College of Forestry.

Foresters feel that the most important factor in this problem is fire prevention and that that is serious. They say that with many of the trained forest fire fighters in the armed forces, the danger of sabotage and the lack of available labor among the citizenry, a greater responsibility than ever before rests upon each person to be careful in handling fire in any form, along the highways, open fields and in the forests.

S. B. Show, of the United States Forest Service, says, "Never before has the need been so great for the civilians to participate and cooperate in the battle against forest fires."

Professor C. C. Delavan, of the New York State College of Forestry, Syracuse University, who was engaged in the fire-fighting forces of the United States Forest Service before he came to Syracuse, urges upon everybody the duty of taking an active attitude in restraining and correcting the costly and dangerous habits of throwing away lighted cigarets and other forms of smoking tobacco and in helping wherever possible to put out fires in the fields or in the woods.

May Newsprint Statistics

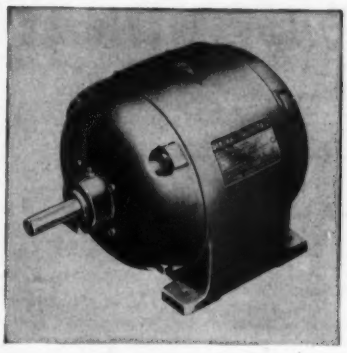
Production of newsprint in Canada during May 1943 amounted to 254,046 tons and shipments to 257,756 tons according to the News Print Service Bureau. Production in the United States was 68,707 tons and shipments 67,138 tons, making a total United States and Canadian news print production of 322,753 tons and shipments of 324,894 tons. During May, 16,379 tons of news print were made in Newfoundland, so that the North American production for the month amounted to 339,132 tons. Total production in May 1942 was 356,866 tons.

The Canadian mills produced 229,587 tons less in the first five months of 1943 than in the first five months of 1942, which was a decrease of sixteen and two tenths per cent. The output in the United States was 62,279 tons or fifteen and four tenths per cent less than in the first five months of 1942, in Newfoundland production was 62,366 tons or forty-six and two tenths per cent less, making a total decrease of 354,232 tons, or eighteen and one tenth per cent less than in the first five months of 1942.

Stocks of news print paper at the end of May were 90,374 tons at Canadian mills and 12,648 tons at United States mills, making a combined total of 103,022 tons compared with 105,163 tons on April 30, 1943, and 185,485 tons at the end of May 1942.

Totally Enclosed Tri-Clad Motors

A new line of totally enclosed motors, the most recent addition to the widely known group of Tri-Clad motors, has been announced by the Motor Division of the General Electric Company. Available in both the polyphase, 60-cycle, induction type and the single-phase, 60-cycle, capacitor type, the new motors are especially designed for use under conditions where abrasives, chemicals, rain, snow, and excessive dirt are encountered.



The polyphase motors are furnished in frame sizes 203 to 225. They include ½, ¾, and 1 hp. at 900 rpm.; ¾, 1, and 1½ hp. at 1200 rpm.; 1, 1½, and 2 hp. at 1800 rpm.; and 1½ and 2 hp. at 3600 rpm. The single-phase motors are furnished in frame sizes 203 and 204, and include ¾ hp. at 1200 rpm.; 1 and 1½ hp. at 1800 rpm.; and 1½ and 2 hp. at 3600 rpm. The mounting dimensions of these motors are interchangeable with Tri-Clad open motors of the same rating.

These new motors have all the important basic features of the Tri-Clad group. This includes triple protection—protection against physical damage, electrical breakdown, and against normal operating wear and tear.

In addition, all parts of the motor enclosures—frame, end shields, and conduit boxes—are cast iron, thus offering exceptional resistance to rust, corrosion, accidental blows, and rough use. Also, the leads are permanently encased in compound in a cast-in pocket in the stator frame, thus preventing liquids from seeping into the motor. Still further protection is provided in the form of a rotating labyrinth seal, which prevents dirt, oil, or water from entering the bearing housing. The motors are wound with Formex wire.

New Air-Operated Controller

A new air-operated automatic control instrument, known as Convertible Free-Vane Controller, has just been announced by The Bristol Company, Waterbury, Conn. The new instrument is made for automatically controlling temperature (up to 3600°F.) flow, liquid level, pressure, draft humidity, pH value, and time program.

The Convertible Free-Vane Controller operates on the same basic Free-Vane principle as that used in previous models offered by the company. In the Convertible-Type Controller a number of design refinements have been incorporated, which simplify the instrument and make it more convenient to service.

The Convertible Air-Operated Controller is offered in the following types: Monoset (on and off), ampliset (throttling), preset, reset, and mangiset.

The adjustments fot fitting the controller to the requirements of the process are located on a dial board above the chart.

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger

EDITOR

Vol. 116 June 17, 1943 No. 24

COMING EVENTS IN PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Fall Meeting, Palmer House, Chicago, September 21-24, 1943.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

LIVING STANDARDS

A very drastic change in the American standards of living is expected to be necessary to put the war economy of the nation at the most efficient level. A substantial lowering of the former high standard has already taken place. The decline during 1942 was marked to almost every one, especially in the last months of the year, when a large variety of goods were frozen and could no longer be purchased excepting on priority and rationing conditions under which the buyer must establish a real need for the goods or products. A relatively small proportion of durable and non-durable goods are now available for most civilian uses, and supplies will be very much lower this year than last year. The living standard of the United States is steadily sinking lower and lower. It is certainly no secret that government plans for non-military business and consumer use, calls for a reduction of the American living standard to about the low level which prevails in Britain.

Although it must be admitted that this low standard of living is not a very cheering one, it seems plain that a war cannot be successfully carried on without sacrifice and hardship. The United States is committed to furnish huge supplies of almost all important commodities and products, as well as to supply a huge armed force. The only possible manner in which this can be done is by sharply restricting the civilian population in its purchase of all non-essential goods, and in some cases, to even decrease the supply, or strictly ration, many of the goods which were formerly considered as essential. The necessary items for health will, so government sources indicate, be supplied but luxuries are soon to be unobtainable for the duration of the conflict.

In putting the country on a strictly war economy the Office of Price Administration is calculated to be the most effective government agency for controlling the price level. It seems obvious enough, that some means of control must be strictly enforced to check the trend of rapidly rising prices, stimulated by both extremely high and rising industrial wages and by the steady decline in the supplies of goods which a high labor income would ordinarily buy. It is unfortunate that industrial wages and agricultural prices were not at once included within the anti-inflationary plan. These are important factors and both continue to make the work of the OPA less effective than it would be if everything produced, bought, sold and consumed were controlled. An all-inclusive wartime control of production and prices was needed, as the Baruch report clearly explained. The lack of completeness is now being experienced as the nation's war effort is rapidly approaching its peak.

In commenting on new forms of price control, the current issue of the *Business Bulletin,* published by the La Salle Extension University, of Chicago, points out that, "To supplement the price control measures that have already been used, other efforts are being planned to combat inflation. One of these methods is the payment of subsidies to producers who cannot meet their costs of production when price ceilings are placed on their products. Some special provision is usually needed to keep up production whenever selling prices are prevented from rising while costs are becoming greater as they are under current conditions. The effect of price control on producers is just as significant as it is on consumers, although greatest publicity has been given to the consumer's interest in low prices. That interest is especially strong in essential commodities . . . Although subsidy payments have many advantages in that they tend to stimulate production while keeping prices down, they are not likely to meet the problem fully. They put a larger volume of money into circulation when the problem is already one of too great supply of purchasing power for the limited supply of goods available. They do, however, reduce the pressure for boosting wages and other costs as demands for high wages will be much less if the cost of living does not rise."

In suggesting that rising prices and inflation can best be controlled by efforts to hold down the amount of income which consumers have left for spending, the article goes on to say that, "Higher taxes and larger purchasing of government bonds by individuals will help reduce consumer buying and thus lessen the pressure toward higher prices. As soon as labor and materials are available for civilian use, a policy of increasing the supply of consumer goods will be most effective in holding the price level stable. Although prices have not yet reached a dangerous level, the significance of the present concentrated efforts of control is clearly evident. The trend is upward in spite

of all that has been done and that fact is more significant than the present level of prices which is but slightly above that which prevailed under normal prosperity. The wise policy, of course, is to use energetic efforts to control inflation before the upward trend has become too strong and possibly uncontrollable. If the present policies are successful, they will do much to help maintain proper balance and to stabilize the price level at a point where drastic future readjustment will not be required."

Columbia Honors Dr. Dorr

At Columbia University's 189th Commencement exercises on June 1, the honorary degree of Doctor of Science was conferred upon John Van Nostrand Dorr in recognition of his contributions to metallurgical, sanitary and chemical engineering as an engineer, inventor and administrator.

The citation of award honored Mr. Dorr's work in all fields of engineering in which he has been active, as having been " . . . of exceptional service to the American people and their industries." Methods and processes sired by Mr. Dorr's basic metallurgical inventions have found widespread usage throughout the Chemical and Allied Industries; and the broad scope of these applications bears testimony to their value.

Mr. Dorr has been the recipient of a number of other honorary degrees. In 1914 Rutgers University, from which he graduated in 1894, made him a Master of Engineering and in 1927, presented to him the honorary degree of Doctor of Science. In 1940 both the South Dakota School of Mines and the Michigan College of Mining and Technology conferred upon him honorary degrees of Doctor of Engineering.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1943		Corresponding Weeks—1942	
May 1	85.7	May 2	99.8
May 8	91.7	May 9	98.2
May 15	91.4	May 16	97.8
May 22	92.7	May 23	93.9
May 29	92.7	May 30	91.4
June 5	85.5	June 6	90.2
(Includes Memorial Day)		(Includes Memorial Day)	

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	87.2	88.8	89.5	88.7	92.0	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1942	80.8	82.8	90.6	86.9	80.1	90.4
1943	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date..	78.1	89.3	67.6	79.8	86.4	92.6	100.8	89.1
Year Average..	80.4	79.8	71.5	83.4	85.6	97.4	90.4	....

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96								

Week ending May 1, 1943—89
Week ending May 8, 1943—96
Week ending May 15, 1943—96
Week ending May 22, 1943—96
Week ending May 29, 1943—95
Week ending June 5, 1943—92

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

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OF AMERICAN PULP

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AND ALL WORLD MARKETS

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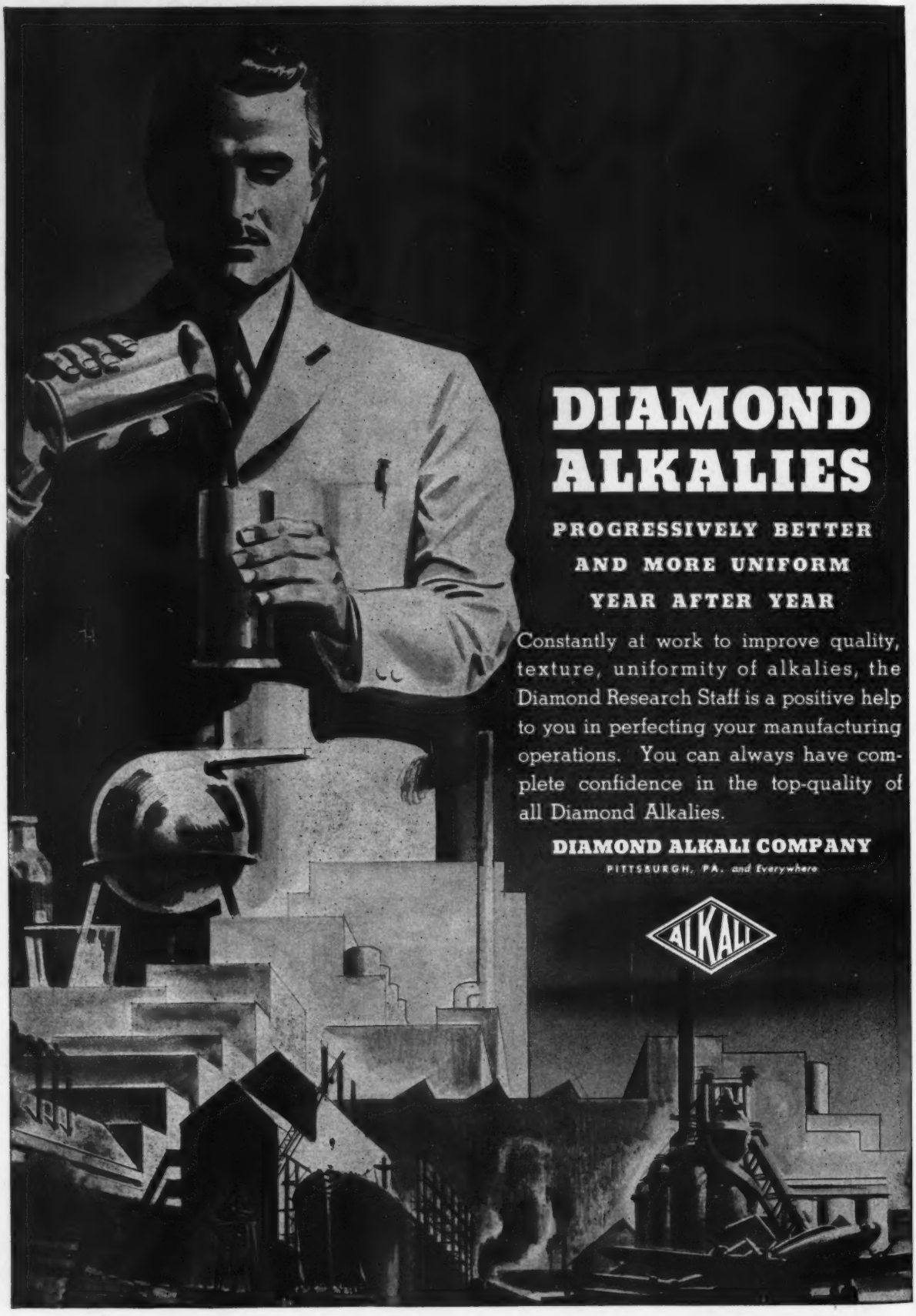
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Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY

Edited by R. G. Macdonald, Secretary

Adhesiveness of Gummed Paper Tape*

TAPPI Tentative Standard T 463 m-43

This method is for testing the adhesiveness of gummed sealing tape not less than 2 inches in width, used for sealing shipping containers.

Apparatus

The testing apparatus shall be the Harnden-McLaurin gummed tape tester having: (1) two adjacent platens in the same horizontal plane forming a table-like top divided in the center, and balanced and so pivoted that on releasing them the adjacent edges tilt upward and apart; (2) means for actuating the platens; (3) a scale with pointer for registering the retardation of the swing of the platens which results from the resistance of the gum of the tape; (4) a roll-feed lever-operated moistener for moistening the gum; (5) a motor-driven roller with automatic timing for pressing the test specimen on the testing paper; (6) a device for feeding a test specimen of correct length; (7) mechanism for synchronized automatic operation of the moving parts.

The roller shall be of iron, 3½ inches wide, 4½ inches in diameter, having a covering of sponge rubber ¼ inch thick on the circumferential surface, and shall weigh 16½ pounds. The moistener shall have a single brush set in a water pan so constructed as to maintain a constant water level. The depth of the water shall be not less than 1 inch, and the brush shall extend 1.7 inches (43 mm.) above the surface of the water. The lever feed shall be set to deliver a piece of moistened tape 5.5 ± 0.1 inches long.

CALIBRATION

Each new machine shall have been calibrated by the manufacturer against a master calibrating instrument at each 10-point interval in the range 15 to 85, and shall be recalibrated by the manufacturer whenever found necessary.

Testing Paper

The testing paper shall be gumming kraft meeting the following requirements:

	Maximum	Minimum
Weight (24 × 36—480), pounds	95	85
Thickness, thousandths of an inch	8.2	7.4
Bursting strength, points	—	90
Smoothness, Bekk tester, average of both sides, seconds	35	15
Water resistance, dry-indicator method, seconds	175	125

The size of the sheets of the testing paper shall be 6 by 9 inches with the grain parallel to the longer dimension.

The sheets of testing paper shall be separately conditioned for not less than 12 hours, according to TAPPI Standard T 402 m for conditioning paper.

Test Specimen

The test specimens shall consist of not less than 24 strips, each 5½ inches in length, cut during the test from each sample roll of tape to be tested.

The sample rolls of tape shall not be conditioned for testing and shall be kept tightly wound until the testing is begun.

Procedure

Tests shall be made in an atmosphere maintained according to TAPPI Standard T 402 m.

Make certain that the apparatus is level in both directions, that the pointer gives a zero reading when the machine is operated without load, and that the moistening device contains distilled water at the same temperature as the testing room.

Prepare the moistening brush for testing by washing in lukewarm water, then soaking for ½ hour in distilled water. If the brush is in continuous use, clean it after testing each sample roll of tape, and at least every two hours.

Place a sheet of the testing paper on the table of the machine, clamp it securely, and with a sharp knife slit it through the center over the opening between the platens. Discard 15 layers of the sample roll of tape to be tested just before cutting the first test specimen. Place the roll in the moistener and feed a strip of the tape 5½ inches long over the moistening brush by operating the feed lever. Cut off the strip immediately and lay it lightly on the testing paper, taking care to center it over the cut in the test paper. The machine automatically passes the roll over the test strip and trips the platens. The interval between the cutting of the test strip and the tripping of the mechanism is 5 seconds with one cycle of rolling. Test at least 24 consecutive strips of each sample, making an equal number of tests on each side of the testing paper.

Scale readings below 15 units or above 85 units are not regarded as dependable. Results shall be disregarded if the test specimen breaks or the pendulum hesitates.

Report

Report as points of adhesive strength the average, minimum, and maximum results, expressed to the nearest whole number, and state the width of the tape in the report.

Reference

Harnden, George H. "Determining the Adhesive Strength of Gummed Tape." *A.S.T.M. Bulletin* 98:23 (May 1939).

* This method has been approved as a tentative standard by the Paper Testing Committee. Criticisms are earnestly requested and should be sent to R. G. Macdonald, Secretary, Technical Association of the Pulp and Paper Industry, 122 E 42nd St., New York 17, N. Y. Reprints of this standard may be obtained from the Secretary at 25 cents each.

Printing-Ink Permeation of Paper*

(Castor-Oil Test)

TAPPI Tentative Standard T 462 m-43

This method consists of measuring the time in which a drop of U.S.P. castor oil produces a uniform translucent spot in paper. It is suitable only for easily permeable papers such as news, book, and mimeograph. It is a measure of the receptivity of paper to printing inks having an oil vehicle.

Apparatus

The apparatus consists of:

1. A box having an open front; a ground glass top containing a ¾-inch hole for observation of the specimen; a ground glass partition parallel with the front side to prevent excess heat from affecting the test results; a 15-watt electric bulb placed back of the partition for illumination of the sample; and an adjustable mirror near the bottom of the box and centered on the hole in the top of the box for observation of the specimen.

2. A separatory funnel or a buret having a tip of such diameter that 25 drops of distilled water drawn at 21° C. (70° F.) will have a volume of 1 ml. The funnel is suspended above the hole in the top of the box, with the tip 1¾ inches from the test specimen.

Test Specimen

The test specimens shall be so selected from the sample secured by TAPPI Standard T 400 m as to be representative of the sample. Specimens 2 inches square are suitable. They shall be conditioned for testing according to TAPPI Standard T 402 m.

Procedure

The test shall be made in the atmospheric conditions specified in TAPPI Standard T 402 m. Before starting the test turn on the electric bulb and allow the temperature of the box to become constant at 25 ± 2° C. (77 ± 3.5° F.).

Place the specimen over the hole in the top of the box. Let a drop of U.S.P. castor oil fall on the specimen and start a stopwatch the instant the drop strikes the specimen. Observe the under side of the specimen and measure the time interval from the instant of contact of the oil with the paper until the spot of oil reaches a uniform and maximum translucency. Covering the spot of oil with a cap having a black interior aids in the determination of the end point.

Report

The report shall give the maximum, minimum, and average time of penetration, to the nearest 5 seconds, for not less than 5 tests on each side of the paper.

References

Reed, E. O. "Resistance of Printing Papers." *Paper Trade J.* 86, No. 12:54 (March 22, 1928); *Tech. Assoc. Papers* 11, No. 1:144-145 and 239-240 (June, 1928).

Wehmhoff, B. L. "Evaluation of the Printing Quality of Paper." *Tech. Assoc. Papers* 18:55, 337-340 (June, 1935).

* This method has been approved as a tentative standard by the Paper Testing Committee. Criticisms are earnestly requested and should be sent to R. G. Macdonald, Secretary, Technical Association of the Pulp and Paper Industry, 122 E 42nd St., New York 17, N. Y. Reprints of this standard may be obtained from the Secretary at 25 cents each.

Technology of Natural Resins

John Wiley & Sons, Inc. have recently published an interesting and useful book on the technology of Natural Resins by C. L. Mantell, C. W. Kopf, J. L. Curtis, and E. M. Rogers of the Netherlands Indies Laboratories in New York

Although an extensive literature exists on synthetic resins, a corresponding development of the much older field of the natural materials is lacking, particularly in regard to their properties, applications, industrial uses, development and technology.

Among the subjects covered are the following: congo, damar, elemi, kauri, the Manilas, mastic, sandaric, thermal processing, chemical modification, lacquer formations, printing inks, emulsions and water dispersions, detection and identification and also physical and chemical testing methods. The book is profuse with classification and properties tables.

There is an interesting chapter showing the compatibility of these resins with such materials as oils, waxes, asphalts, pitches, chlorinated rubber, cellulose acetate, ethyl Cellulose, synthetic resins. Other subjects covered include adhesives, moistureproof coatings, linoleum.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y. at $7.00 per copy.

Dictionary of Science and Technology

The Philosophical Library, Inc., has recently issued a useful 386 page Dictionary of Science and Technology by Maxim Newmark of the Brooklyn Technical High School. It contains 10,000 current terms in the English language most frequently used in the physical sciences and their applied fields, together with separate indices in French, German and Spanish. It also contains a number of conversion tables. Each item is numbered and permits a two-way use of any of the languages.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York 17, N. Y. at $6.00 per copy.

Paper Inventories Index Lower

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 16, 1943—The April index of the value of paper manufacturers inventories was 139.0 compared with 139.3 in March and 141.1 in April of last year taking an average 1939 month at 100 according to the monthly industry survey of the Department of Commerce.

Also taking an average 1939 at 100 the April index of the value of paper manufacturers shipments was 159 compared with 155 in March and 165 in April of last year according to the same tabulations.

Performance of Evaporators*

By J. P. Rubush[1] and G. E. Seavoy[2]

Abstract

The subject is discussed with particular reference to operating conditions under war economy. It is pointed out, with examples, that reducing a mill capacity involves problems of economical operation by rearrangements which should receive as much thought and study as increasing the production rate.

It is further shown that for each particular mill and conditions, there are optimum inter-related operating conditions in the pulp washing, evaporation, and recovery furnace operations which result in minimum costs.

The importance of instrumentation control and the interpretation of resultant quantitative data is stressed in the use of such information to anticipate process troubles such as loss of capacity due to scaling, fouling and corrosion. Methods are described for cleaning the tubes on both the vapor and liquor sides.

The ever important subject of tube-life is discussed. The fundamental reason why no specific conclusions can be deduced from a wealth of accumulated operating data on tube life is that the complexity of variables and inter-relationships involved have not been qualitatively and quantitatively evaluated. The use of partially chromium plated tubes holds promise of approximately doubling the life of low-carbon steel tubes.

In a previous paper we considered evaporator performance under then existing conditions, where the industry was operating at a relatively high rate of production, and where the maximum capacity was of primary importance. Today the general viewpoint is reversed. The pulp and paper industry is not under forced draft operation, generally speaking. Production rates are lower and economy of operation, particularly as regards maintenance, is of primary concern because of the difficulty of obtaining replacement materials and the necessity of keeping going under war time restrictions.

Economical operation embraces the following main items:

1. Maintaining the maximum pounds of evaporation per pound of steam consumed.
2. Maintaining the highest optimum percentage of total solids in the feed solution to the evaporator.
3. Concentrating the liquor to the highest possible percentage of total solids preliminary to the recovery furnace.
4. Minimizing chemical losses.
5. Avoid using excess water.
6. Operating with the minimum labor force.
7. Freedom from mechanical troubles.
8. Freedom from process troubles.

These will be discussed in more detail. Although such a discussion may be trite in many instances, the possible inclusion of some unthought of factor may justify the argument.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 15-18, 1943.

[1] Member TAPPI; Executive Engineer, Swenson Evaporator Co., Harvey, Ill.

[2] Member TAPPI; Vice President, Swenson Evaporator Co., Harvey, Ill.

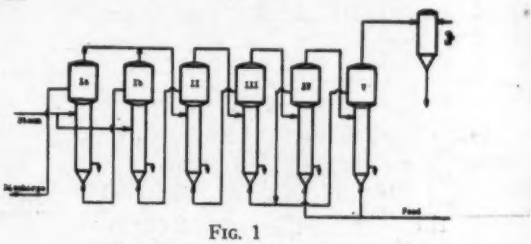

FIG. 1

6-Body Quintuple Effect Evaporator

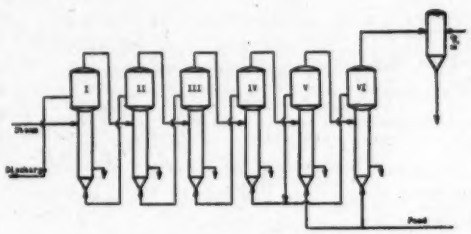

FIG. 2

Rearrangement as 6-Body Sextuple Effect Evaporator

1. Maintenance of Maximum Evaporation Economy

Existing installations are presumably operated at their best under normal conditions. This presumption is too often nonvalid—The result of a "laissez-faire" attitude, inadequate instrumentation and control, and lack of competent supervision. Certainly the correction of this situation is primarily a management problem. It is necessary to know first "what the machine is doing" compared to what it is designed to do or can do by comparison with previous records.

When the overall production of a mill is reduced it is not sufficient to simply throttle the equipment. Serious thought should be given as to the most economical methods to be followed. For instance, if there are two sextuple effect evaporators and the production rate is halved it is quite obvious that the optimum performance is to shut down one of the evaporators. If, however, the mill has a single evaporator installation oconsisting of a 6-body quintuple effect, it is very likely that under reduced capacity the equipment can be rearranged to operate as a 6-body sextuple effect, with higher steam economy. (*See* Figs. 1 and 2 and Table I.) The general method of analyzing the problem in this respect was discussed in the previous paper. Along this same line a mill having say two quadruple effect evaporators might very well revise their arrangement to an 8-body quintuple or sextuple effect

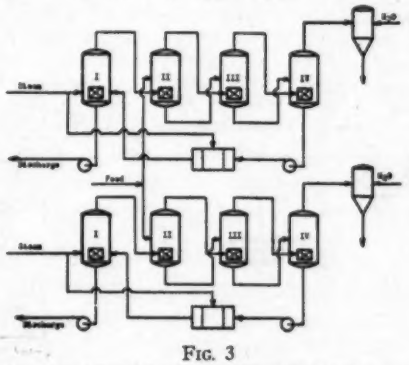

FIG. 3

2 Identical 4-Body Quadruple Effect Evaporators

TABLE I.—COMPARISON

	6-Body Quintuple Fig. 1	6-Body Sextuple Fig. 2
Feed density, feed temperature, discharge density, steam pressure, last effect vacuum.....	Same	Same
Total H.S. (heating surface), sq. ft.....	100	100
H.S. per effect, sq. ft.....	100/5=20	100/6=16.67
Total working (net) temp. drop, °F.....	100	100—12*=88
Temperature drop, per effect, °F.....	100/5=20	88/6=14.67
Overall coefficient of heat transfer **	275	300
Estimated capacity (evap'n rate), g.p.m.....	100	$\frac{16.67}{20}\times\frac{14.67}{20}\times\frac{300}{275}\times 100=66.7$
Economy, lb. evap'n/lb. steam	4.1	4.9

* One added boiling point rise.
** Long-tube vertical type evaporator.

evaporator to obtain both better steam economy in the evaporation stage and higher discharge density liquor, resulting in greater steam production from the recovery furnace. (*See* Figs. 3 and 4 and Table II.)

In this same vein incremental improvements in steam economy can be obtained by the installation of relatively simple condensate flash systems (resulting in the elimination of multiple condensate pumps and motors), and liquor flash tanks to recover the heat from the high temperature discharge liquor, which will also reduce the odor around the mill.

TABLE II.—COMPARISON

	2 Quad.'s Fig. 3	1 8-Body Quintuple Fig. 4
Feed density, feed temperature, discharge density, steam pressure, last effect vacuum	Same	Same
Total H.S. (Heating Surface), sq. ft.....100+100=200		200
Total working (net) temp. drop, °F.....	200/8=25	200/5=40
H.S. per effect, sq. ft.....	100	100—12*=88
Temperature drop per effect, °F.....	100/4=25	88/5=17.6
Overall coefficient of heat transfer **	100	85
Estimated capacity (evap'n rate), %	100	$\frac{40}{25}\times\frac{17.6}{25}\times\frac{85}{100}\times 100=95$***
Economy, lb. evap'n / lb. steam	2.75	3.4

* One added boiling point rise.
** Horizontal-submerged-tube type evaporator.
*** Could raise discharge density at expense of further capacity decrease.

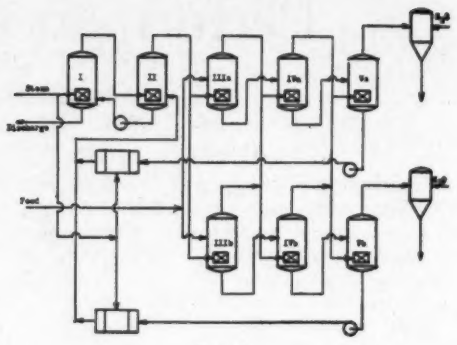

FIG. 4
Rearrangement as 8-Body Quintuple Effect Evaporator

2. Maintenance of High Total Solids

It seems rather obvious that the percent of total solids in the black liquor from the pulp washing operation should be maintained as high as possible. Based on pure economics, there is an optimum feed density which is governed by such factors as the cost of steam, the number of evaporator effects (steam economy), the cost of make-up chemicals, etc. For instance, in a mill employing a sextuple effect evaporator of high steam economy, the alkali in the pulp from the pulp washing operation can be reduced to a lower figure than in a mill using only quadruple effect evaporators, assuming the steam cost is about the same.

Using the same argument as under Item 1, rearrangement of the pulp washing equipment to employ all or nearly all of the equipment with more stages of washing or longer cycles of washing, with consequent better recovery of chemicals is frequently possible and advantageous when the mill capacity is to be reduced.

Example: Showing the possible savings by more complete washing of alkali from the pulp, when additional evaporator capacity is available to handle the extra wash water. (*See* Fig. 5.)

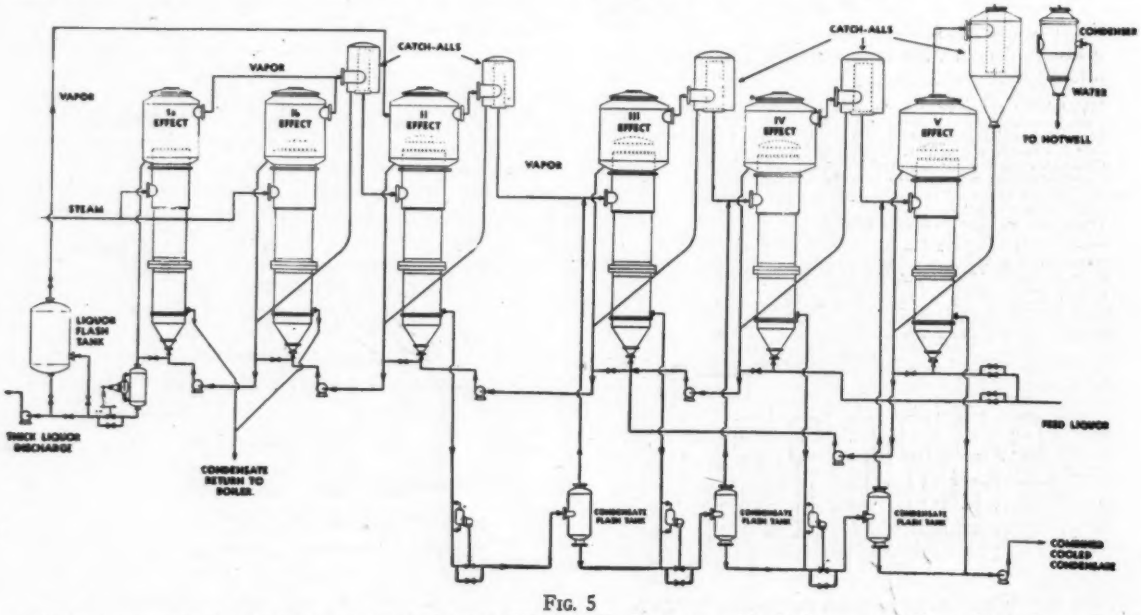

FIG. 5
Typical Arrangement of a Backward Feed 6-Body Quintuple Effect L.T.V. Evaporator with Condensate and Liquor Flash Systems*
* U. S. Patent 2,044,095

Item	1	2	Difference
Na_2O per ton of air-dry pulp on pulp as washed, lb.	35	25	−10
Equivalent lb. makeup Na_2SO_4	.....	.....	−22.9
Total solids in black liquor to evaporator, lb.	2800	2825	+25
T.S. in black liquor to evaporator, %	17.0	15.0	− 2
T.S. in black liquor from evaporator, %	53.0	53.0	....
Water to be evaporated per ton of pulp, lb.	11,187	13,503	+2,316

Assume salt cake costs $16.00 per ton.
Assume steam costs 15c per 1000 lb.
Assume evaporator economy 4.1 lb. evaporation per lb. of steam.

$$\text{Saving in salt cake} = \frac{22.9 \times 16.0}{2000} = \$0.1832$$

$$\text{Cost for additional steam} = \frac{2{,}316 \times 0.15}{4.1 \times 1000} = 0.0848$$

Net saving per ton of pulp $0.0984
Net saving for 200 tons/day of pulp $19.68
Net saving for 200 tons/day, for 350 days $6,888.00

3. Concentration

Since the steam-producing capacity of the recovery furnace is directly affected by the percent of total solids in the liquor discharged from the evaporator, ever present attention to this factor is one of the most important things to watch and control in maintaining high overall economy of operation in the pulp mill. This is possible and practical even when the evaporator arrangement is revised to obtain higher economy at the same time, as described under Item 1. An important consideration in this respect is maintenance of clean heating surface, which will be discussed under a subsequent heading.

4. Chemical Losses

Chemical losses in the evaporator house ordinarily occur from the following:

(a) Soda left in the pulp after the washing operation.
(b) Entrainment in the evaporator.
(c) Spillage and tank washings.

Maintaining low chemical losses is primarily accomplished by unrelenting attention to control. A systematic and automatic procedure should be a routine matter in the detection of increased losses and when these are noted steps should be immediately taken to correct the problem. The causes of abnormal entrainment in a vacuum evaporator are usually air leakage and poor pump performance. In old style submerged tube evaporators maintenance of certain minimum densities in the bodies is essential to prevent excessive foaming—the common cause of rather excessive chemical losses.

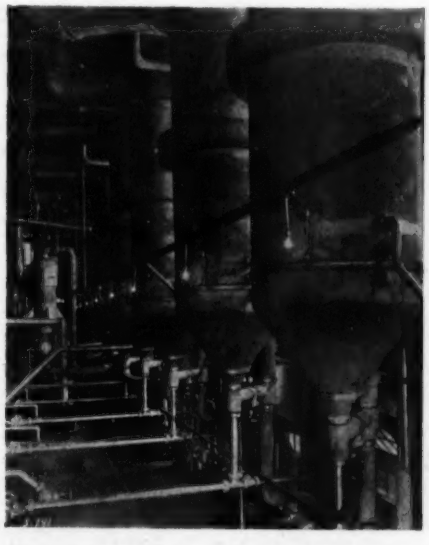

FIG. 6
Large 9-Body Quintuple Effect Kraft Mill Black Liquor Evaporator. Evaporative Capacity over 400,000 lb. Hourly—One of the Largest Chemical Evaporators in the World

Steady and uniform operation is a pertinent factor in efficient evaporator performance, as it is with many types of equipment. Instrumentation will assist very materially in this regard but the human factor of operation must not be overlooked as, for example, it is not uncommon to note considerable difference in performance results between shifts. A merit or bonus system, as frequently used in chemical plants as an incentive to obtain highest efficiency of operation, could be adapted to pulp mill operations and pay for itself.

5. Excess Water

Excessive use of water is usually the result of inefficient condenser operation. This is usually evidenced when the terminal difference (saturated vapor temperature to the condenser, minus the condenser tail pipe temperature) exceeds 15° F. for water jet condensers and 5-7° F. for countercurrent, barometric type condensers. The causes are increased air leakage and inefficient removal of noncondensable gases which may be the result of dirty nozzles, scaled condenser, leaks in the tail pipe, etc. Control of the amount of water by a thermometer in the condenser tail pipe will serve to prevent excessive water consumption. A common misconception of an operator is to run with a "cold" tail pipe. (*See* Fig. 6.)

6. Operating Labor

No single evaporator installation should require more than one operator per shift. If two evaporators are adjacent, a single operator can handle both machines and if adequate instruments and controls are available he can, in addition, take on other nearby duties.

7. Mechanical Troubles

About the only moving parts of an evaporator are the pumps and actuating parts of instruments, such as floats, etc. Pumps, however, are the heart of a multi-effect evaporator setup and critically important items to keep operating steadily and efficiently. In addition to routine periodic lubrication and packing inspection, the pumps should at intervals of several months be disassembled for internal inspection of wear. These items assume greater importance on the larger pumps such as the circulating pump of the forced-circulation-type evaporator. In this case, it is advisable to check the power consumption frequently as process troubles, such as tube plugging and scaling, can often be detected in advance by noting changes in power input.

Responsibility for the good mechanical operation of all instruments, indicating and recording, should be vested in an instrument man whose duties are entirely devoted to this work. (*See* Fig. 7.)

8. Process Troubles

The main items involved in the category of process troubles around an evaporator installation are:

(1) Scaling and fouling of the heating surfaces (on the steam or the vapor side, and on the liquor side of the tubes).
(2) Corrosion.
(3) Condensate removal.
(4) Venting.

Existence of all of the above process troubles is evidenced by loss of capacity, and frequently loss of economy. The frequency of occurrence is in the order given. As a matter of experience, fouling of the steam or vapor side of the tubes (except in the first effect) is the most common cause of loss of

capacity. This is really the result of a corrosive condition from sulphide and organic gases, evolved from the boiling liquor in the previous effect, coming in contact with the steel tubes at the condensing surface of the succeeding effect and forming iron sulphide compounds which accumulate and add a resistance to heat transmission. Generally speaking, fouling of the tubes on the vapor side is less in the second effect, more in the third effect, etc., as the noncondensable gases which contain the corrosive agents progressively increase and come in contact with the tubes in succeeding effects. A suggested remedy to minimize the rate of fouling on the vapor side of the tubes is to separately vent each heating element direct to the condenser. Contrary to a very common misconception, the heat loss, if venting is properly done, is negligible.

A typical analysis of sulphide scale from the steam or vapor side of the tubes in a black liquor evaporator is (taken from the second effect of a quintuple effect evaporator):

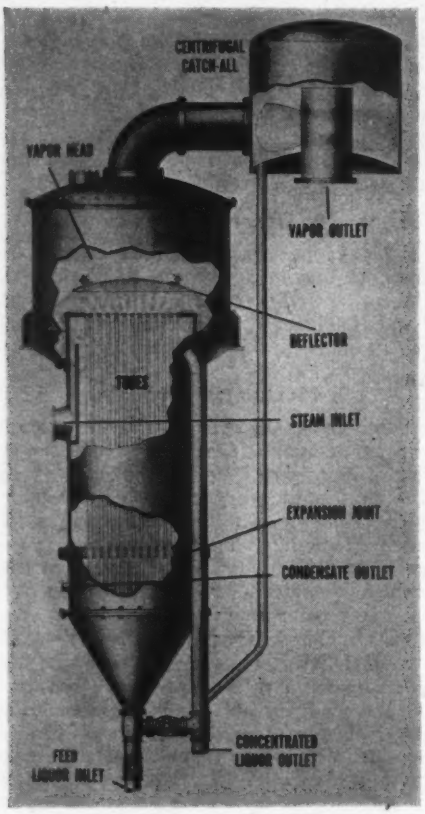

FIG. 7—PRINCIPLE OF OPERATION

The liquid to be concentrated is fed into the bottom of the evaporator. Depending on the feed temperature, the liquid level rises part way into the bank of tubes forming the heating element. Steam or vapor enters the side of the heater and gives up its latent heat to the relatively cold tubes. The condensate that forms is drawn off from the bottom of the heater, along with any noncondensable gases.

The hot tubes transmit their heat to the liquid within the tubes. Rapid evaporation, aided by a low hydrostatic head, induces a high velocity of vapor and liquid upward through the tubes, which tends to reduce the high-resistance liquid stagnant film on the tube walls, thereby further increasing the flow of heat from the tubes to the vapor and liquid within. As the high-velocity mixture of vapor and liquid leaves the upper end of the tubes, it strikes a deflector, causing a gross separation to take place between boiling liquid and vapor. The vapor, together with its entrainment, passes into a centrifugal type of catch-all for the final separation, the vapor rising to the top of the catch-all and passing down and out through a pipe extending through the bottom. The liquid collected in the vapor head and catch-all is piped to the next effect. This gives single pass flow of the liquor through the tubes of an effect. Obviously, single pass operation requires no control of liquor level.

$Fe_2(SO_4)_3$	25.2%
FeS_2	38.4%
Fe_2O_3	36.4%

This scale is usually rather fluffy and may contain pulp, carried over from the preceding effect with light foam. The scale, however, hardens with age and may become difficult to dissolve if not removed at regular intervals.

An effective removal method is to isolate the effect and proceed as follows:

(1) Fill the steam chest nearly full with undiluted white liquor. (In a vertical heating element remove the vent plug in the top tube sheet to remove trapped air.)
(2) Admit direct steam for at least 24 hours. The steam raises the temperature, increases the chemical reaction and provides turbulence.
(3) Drain the white liquor to the black liquor feed tank.
(4) Fill with water and bring to boil with direct steam and drain to sewer.
(5) Fill steam chest again with a 3-5% solution of phosphoric acid (H_3PO_4) and allow to stand without heating 1-2 hours.
(6) Drain out acid.
(7) Flush out the loose scale from the steam chest. If this scale is not removed from the bottom tube sheet there is a tendency towards pitting of the tubes. Be sure condensate outlets are free after the above.

The foregoing should be done at frequent intervals. If not, the scale will harden and be more difficult to remove—frequently requiring two or more boilouts as described above, to accomplish a good cleaning job.

A 10% caustic soda solution is perhaps as effective as white liquor but white liquor is always available in kraft mills. Caustic soda liquor is, however, available in mills with bleach plants. A solution of soda ash has been used but with less effectiveness than either white liquor or caustic soda.

Scaling is a phenomenon on the liquor side of the tubes resulting from the precipitation from the black liquor of inorganic compounds which have reached saturation in the liquor. These inorganic compounds are calcium carbonate, sodium sulphate and sodium aluminum silicate. These salts all have inverted solubility characteristics, that is, in the range of temperatures in the evaporator, the solubility decreases with temperature. Thus the solubility is least in the liquor film adjacent to the hot tube. This accounts for the marked tendency of compounds of this nature to form scale on the hot tubes.

To prevent scaling of the evaporator tubes from sodium sulphate, the Na_2SO_4 content of the total solids in the black liquor should not exceed 6% of the weight of the dissolved total solids (dry basis). This will be exceeded and result in evaporator scaling troubles if the efficiency of reduction in the recovery furnace falls off.

Calcium carbonate scale in the evaporator will occur if the overflow from the white liquor clarifier is not clear.

The worst scaling condition is one in which the scale is of a sodium aluminum silicate composition of glasslike nature. This scale varies in composition; 19-37% SiO_2, 17-28% Al_2O_3, and 15-30% Na_2O. Silica is, of course, admitted to the system in the wood but this in itself is generally insufficient to cause a troublesome scaling problem. A silica scale of this nature is usually the result of high SiO_2 and Al_2O_3 contents in the makeup lime and from poor quality furnace linings.

Inorganic scaling of the tubes on the liquor side is prevalent in increasing degree in the higher density and higher temperature effects. Note, this is the opposite of the fouling of the vapor side of the tubes.

In the case of a sodium sulphate scale it can be removed by frequent water boilouts. In the case of a scale predominantly calcium carbonate, it can be effectively removed by circulating a 5% inhibited muriatic

acid solution at room temperature. The sodium aluminum silicate scale is, on the other hand, difficult to remove. The scale is usually relatively thin and transparent but is extremely hard and glasslike. Its transparent property frequently makes it difficult to detect. Because of its glasslike nature, it is also too hard for removal by mechanical means. It can be dissolved by strong mineral acids, but, of course these are impractical because of their corrosive action on the equipment. One of the most effective methods deveoped for removing this type of scale is a 20% solution of sodium acid phosphate which can be readily prepared by adding sulphuric acid to a solution of salt cake in accordance with the following reatcion:

$$Na_2SO_4 + H_2SO_4 \rightarrow 2\ NaHSO_4$$

This solution should be circulated through the tubes for 3-4 hours at a temperature of approximately 160° F. at which temperature the reaction appears to be most rapid. The sodium acid sulphate reacts with the scale to form silicic acid (H_2SiO_3) which is gelatinous and tends to insulate the scale from further or complete chemical attack. The solution should be drained off and the scale dried with steam. This dehydrates the silicic acid which can then be removed by mechanical means or the use of a high-pressure water jet. If the original scale is relatively heavy the above operations should be repeated as required.

Another type of fouling on the liquor side of the tubes comes from the formation of a gummy organic scale from the soap compounds in the black liquor. This is frequently further complicated by the inclusion of pulp fibers. This type of scale can usually be removed by frequent water boilouts but the primary cause should be removed first, by proper removal of the pulp fibers from the black liquor and, second, by the employment of a soap skimming tank in the system, preferably at that effect in the evaporator where the concentration of the discharge liquor is approximately 24-26% total solids content.

It should be emphasized that fouling or scaling of the heating surface, whether on the vapor side or on the liquor side, in substance adds an additional resistance to heat transfer. Since the total amount of heating surface is constant, the inevitable result is a reduction in the total amount of heat transferred or, in other words, a falling off in capacity which, as previously indicated, was the direct effect of process troubles derived from scaling or fouling. It will be recalled that fouling on the vapor side is more prevalent in the latter effects, that is, the low temperature, low density effects, and scaling or fouling on the liquor side of the tubes is more prevalent in the front effects, that is, the high temperature, high-density effects. This then provides a general method of detection.

With proper instruments the distribution of pressures and vacuum in the various effects with a clean machine, under normal conditions, is or should be known. When, over a period of time (scaling and fouling is usually a relatively slow process), the pressure and vacuum levels shift as evidenced by increases in the vapor pressure in the first effects, it can be logically reasoned that, since the total working temperature drop across all of the effects is essentially constant, the temperature drops across the front effects have been reduced, and, therefore, the temperature drops across the latter effects have increased. This means that such an increase in the temperature drops is the result of added resistances to heat transfer and evidence of fouling on the vapor side of the tubes, in the latter effects.

By the same reasoning, when the pressures or vacua in the front effects become lower over a period of time, the working temperature drops across these effects have correspondingly increased, indicating the result of added resistance to heat transmission, namely

TABLE III.—TEMPERATURE—PRESSURE DISTRIBUTION WITH CLEAN HEATING SURFACES

Effect	Ia	Ib	II	III	IV	V	Overall Ib-V
* Steam Press., p.s.i., gage	27.5	27.5	3.75	7.5" vac.	17"	22¾"	
Steam Temp., °F.	270.5	270.5	223.5	197.5	172	148	
Temp. drop, °F.	33.0	36.5	17.0	16.5	13	20	103.0
Liquor temp., °F.	237.5	234.0	206.5	181.0	159	128	
Boiling point rise, °F.	12.0	8.5	7.0	5.5	4	5	
Vapor temp., °F.	225.5	225.5	199.5	175.5	155	123	
* Vapor press., p.s.i., gage	4.5	4.5	6¾" vac.	16"	21¼"	26½"	27" @ cond.
Press. drop, p.s.i., gage	0.75	0.75	¾"	1"	1⅜"	⅜"	
Steam flow	28,000 lb. per hour.						

* Observed readings from instruments.

TABLE IV.—TEMPERATURE—PRESSURE DISTRIBUTION WITH SCALED HEATING SURFACES IN FIRST EFFECTS. NOTE REDUCED VAPOR PRESSURE IN FIRST EFFECTS, e.g. CONSIDERABLE HIGHER TEMPERATURE DROPS.

Effect	Ia	Ib	II	III	IV	V	Overall Ib-V
* Steam Press., p.s.i., gage	27.5	27.5	0.5	11" vac.	18½" vac.	23¾"	
Steam temp., °F.	270.5	270.5	214	190	168	146	
Temp. drop, °F.	*43.5*	*47.0*	16	14.5	12	18	107.5
Liquor temp., °F.	227.0	223.5	198	175.5	156	128	
Boiling point rise, °F.	12.0	8.5	7.0	5.5	4	5	
Vapor temp., °F.	215.0	215.0	191	170	152	123	
* Vapor press., p.s.i., gage	*1*	*1*	10.5" vac.	18" vac.	22" vac.	26½"	27" @ cond.
Press. drop, p.s.i., gage	1.0	1	½"	½"	1¼"	⅜"	
Steam flow	22,000 lb. per hour						

* Observed readings from instruments.

TABLE V.—TEMPERATURE—PRESSURE DISTRIBUTION WITH FOULING OF TUBES ON VAPOR SIDE IN THE VACUUM EFFECTS. NOTE HIGHER VAPOR PRESSURE IN FIRST EFFECT—e.g. LOWER TEMPERATURE DROPS IN FIRST EFFECTS BUT INCREASED TEMPERATURE DROPS IN LATTER EFFECTS.

Effect	Ia	Ib	II	III	IV	V	Overall Ib-V
* Steam press., p.s.i., gage	27.5	27.5	9	2" vac.	15"	22"	
Steam temp., °F.	270.5	270.5	237	209	179	152	
Temp. drop, °F.	19.5	23.0	*20*	*22*	*18*	*24*	107
Liquor temp., °F.	251.0	247.5	217	187	161	128	
Boiling point rise, °F.	12.0	6.5	7	5.5	4.0	5.0	
Vapor temp., °F.	239	239	210	181.5	157	123	
* Vapor press., p.s.i., gage	*10*	*10*	1¼" vac.	14" vac.	21"	26½"	27" @ cond.
Press. drop, p.s.i., gage	1	1	¾"	1"	1"	⅜"	
Steam flow	19,000 lb. per hour.						

* Observed readings from instruments.

scaling or fouling on the liquor side of the tubes, in the front effects.

Since scaling and fouling are the most frequent cause of process trouble, falling off of capacity, etc., it becomes vitally important to have good instrumentation. This in itself is, however, insufficient. The important consideration is the use of these instruments in control and the interpretation of the results in the detection of scaling conditions before they get out of hand. The following examples show in general the shifting of pressures and vacua from scaling and fouling:

Regarding corrosion, the points in an evaporator where this is of most frequent occurrence are:

(1) The upper inside end of vertical long tubes, including the top tube sheet.
(2) On the lower outside of the tubes at the condensate level on the bottom tube sheet.
(3) All parts of the condensate removal system.
(4) The condenser tail pipe, particularly at the water level in the hot well.
(5) The outer part of the upper heating element extending into the vapor head and the bottom dished head of the vapor head.

In general, points of high corrosion are places at the inter-face of liquor and vapor where relatively high liquor velocity or turbulence occurs and places where liquor or a mixture of liquor and vapor impinge.

This is perhaps a good point to bring up the ever recurring question of tube life. The only long life material for tubes in black liquor evaporators thus far known is stainless steel of the 18% chromium, 8% nickel type. This is, except in the case of forced circulation type evaporators and some special cases, too expensive to generally justify.

A wealth of information on the life of steel and alloy tubes has been accumulated by the authors. Because of the confidential nature of many of these data, they cannot be reproduced here. From a study of these data, however, it must be admitted that no very specific conclusions can be deduced. The fact is that the variables affecting tube life are too many and complex, and have not been qualitatively nor quantitatively evaluated. These variables are the physical and chemical properties of the tube material, the physical and chemical properties of the liquor evaporated and the physical design of the equipment itself. With so many possible factors potentially affecting tube life and lack of quantitative evaluation of isolated factors, it is not surprising that the general data obtained on tube life are so difficult to rationalize. About the only general statements which can be made with reference to tubes in natural circulation type of black liquor evaporators is that seamless low carbon steel tubes have essentially

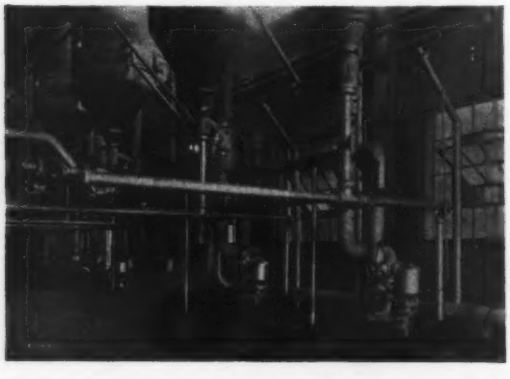

FIG. 8
Operating Floor View of a Modern Quintuple Effect Kraft Mill Black Liquor Evaporator

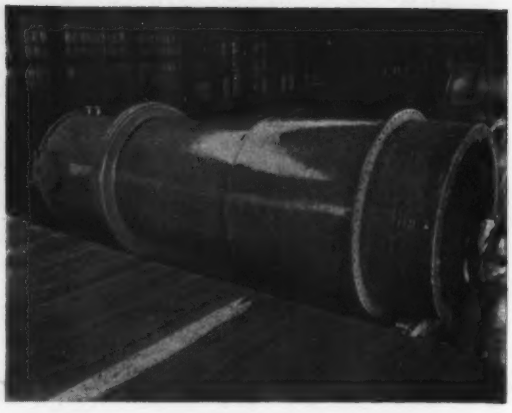

FIG. 9
Shop View of a Black Liquor Evaporator (Vertical Long Tube Type) Heating Element

the same life as low carbon welded steel tubes. Furthermore, from several cases 4-6% chrome steel tubes appear inferior to ordinary low carbon steel tubes although the presence of molybdenum with the chromium improves the life but hardly enough to justify the additional expense of the alloy tubes.

A rather recent development which should be substantiated by more installations involves the use of chromium plating on the liquor side of vertical long tubes over a length of approximately 2 feet at the upper end. The experience to date indicates and holds promise that this will approximately double the life of the low carbon steel tube and justify the expense of the plating.

It is axiomatic that the condensate formed on the tubes must be adequately drained away, else it will simply add a tremendous resistance to the heat flow. Most modern evaporators have condensate flash systems and, if they are properly designed, provide a gradient flow of the condensate and adequately remove the condensate from the steam chest. However, the realization of the additional heat economy to the extent of 3-5% of the steam consumed is only possible if proper traps, or drainers, or orifices are used. Since the condensate is corrosive the important parts of the traps, drainers or condensate removal pump should be of stainless steel construction. In addition, the entire condensate removal system should be inspected, cleaned and tested for leaks periodically.

The noncondensable gases, which include air leakage, gases dissolved in the liquor and gases evolved from the liquor by thermal decomposition, must be efficiently and effectively removed from each steam chest to eliminate their insulating effect on the condensing surface. For instance, the coefficient of heat transfer from a noncondensable gas to a metal is in the order of magnitude of 10, whereas the coefficient of heat transfer from a condensing vapor to a metal tube is in the order of magnitude of 1000. It is, therefore, highly important that venting should be full, not throttled. It is better to overvent than undervent as the amount of steam loss by overventing is, on any commercial evaporator, negligible.

In conclusion, it is pertinent to emphasize that all of the various things in evaporator performance as described as important in war economy should receive the attention of the mill management and supervision of operators at all times.

A Theory of Box Compressive Resistance in Relation to the Structural Properties of Corrugated Paperboard*

By John R. Little[1]

Abstract

A relation between the structural properties of corrugated board and the top-to-bottom compressive resistance of the box was derived from the engineering column formulas. This relationship is expressed in the form of a curve with the ratio of maximum box load per inch of periphery to paperboard compression strength per inch plotted against the box length times the square root of the ratio between board compression strength and stiffness factor (EI). This curve can be used to estimate the top-to-bottom box compressive resistance of any corrugated regular slotted square box from the compression strength and stiffness factor of the paperboard. This estimate of box compressive resistance does not take into account manufacturing variables such as scores, printing or adhesion and will therefore be somewhat higher than can ordinarily be expected from commercial boxes.

A description is given of tests which can be used to determine the compression strength and stiffness factor of corrugated board. The experimental value of these properties as well as the corresponding top-to-bottom box compressive resistance is given for a variety of types of corrugated board.

It is concluded that the compression strength and stiffness factor of corrugated board are related to Olsen compression test in a definite manner and are therefore a measure of that quality of corrugated board, which, when made into boxes, enables it to resist compressive forces.

The distinguishing characteristic of a box as opposed to a bag is its ability to resist forces tending to compress or distort it from its original shape. The measurement of this attribute is the function of the box compression (Olsen) test. No other adequate test has yet been devised to measure this quality of paperboard, though it is evident that resistance to distorting forces is dependent on paperboard properties as well as on box design. Thus, it should be possible to accurately measure those qualities of corrugated paper board on which the compression resistance of every box depends.

The flat crush test on corrugated paper board and the ring test on uncombined paperboard were both devised to evaluate stiffness, but neither test by itself is completely satisfactory because the relationship between these tests and the box compression test is not definitely established. It is only known that, in general, an increase in the flat crush or ring test will cause an increase in the box compression test. While these tests are useful in controlling the quality of paperboard, any method of testing corrugated paperboard bearing a definite relationship to box compressive resistance should be a valuable aid in the interpretation of paperboard quality and provide a better understanding of those properties of corrugated paper board which enable the box to resist distorting forces.

With this in view, a theory was devised and supporting data accumulated which indicates that the top-to-botton compression resistance of box shapes may be predicted with reasonable accuracy from two separate properties of the corrugated board: (1) The compression strength when bending is reduced to a minimum, and (2), the stiffness factor *(EI)* expressed as the product of *the modulus of elasticity* and the *moment of inertia*.

Such manufacturing faults as poor scores, wide finger lines, faulty adhesion, and heavy printing will reduce the box compression resistance below the value predicted by tests on the board as would naturally be expected. In developing the theory, the assumption was made that corrugated board is uniform in its properties and that the same laws could be applied to it which govern other elastic materials.

Compressive Resistance

The formulas used in determining the strength of steel columns were therefore reviwed with the idea of applying them in modified form to corrugated boxes. It was found that in all formulas for columns the maximum load P divided by the cross sectional area A is expressed as some function of the length H of the column divided by its radius of gyration R such that when P/A plotted against H/R a curve is formed, which can be used in calculating the maximum load that can be applied to any steel column.

An analogous method appears to be applicable to corrugated boxes. Rankine's column formula, the derivation of which may be found in tests on the strength of materials, can be written as follows:

$$\frac{P}{A} = \frac{S'}{1 + K \dfrac{S' H^2}{E R^2}}$$

where P = Maximum load
A = Area of cross section
H = Length of column
R = Radius of gyration
E = Modulus of elasticity
S' = Maximum stress per unit area
K = Constant

For structural steel K, S', and E are all constants so that Rankine's formula reduces to the expression:

$$\frac{P}{A} = \frac{c}{1 + K' \dfrac{H^2}{R^2}}$$

where c and K' are constants.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 15-18, 1943.

[1] The Hinde & Dauch Paper Co., Sandusky, Ohio.

It will be seen from this equation that P/A is a function of H/R and therefore may be plotted in the form of a curve with values of P/A in one direction and values of H/R in the perpendicular direction. However the value of S' and E are not constants for corrugated board and therefore must be determined for each type of board.

Assuming that Rankine's formula is applicable to corrugated boxes and that it is possible to calculate the load on each side of a box separately; then, if

t = Thickness of the board
L = Length of one side
P = Maximum load on one side

then, tL equals A and Rankine's formula becomes:

$$\frac{P}{S' tL} = \frac{1}{1 + \frac{KS' tH^2}{EsR^2}}$$

In this equation S' is the stress per unit area; therefore, $S't$ is the stress per unit length and we may replace S' by S where S is understood to equal the stress per unit length. Also if I is understood to be the moment of inertia per unit length of cross section we may substitute I for tR^2. After making these substitutions the equation becomes:

$$\frac{P}{SL} = \frac{1}{1 + K\frac{SH^2}{EI}} \text{ or } \frac{P}{SL} = \text{a function of } \sqrt{\frac{S}{EI}}\, H.$$

If the box side were actually separated from the box, the formula derived above would apply. However, since the box side is constrained from bending at the two vertical score lines a further modification is necessary. By substituting L for H, where L represents the length of the box side, an expression is derived which can be applied to boxes. While there does not seem to be any rigorous proof justifying the substitution of L for H in the formula, it may be argued that if the box is sufficiently high normal failure will occur along a line represented by the dotted lines in Fig. 1, and that as the length L of the box increases, the distance d increases proportionately. Since the effective column length H is represented by d in Fig. 1, L may be substituted for H in the formula which then becomes:

$$\frac{P}{SL} = \text{a function of } \sqrt{\frac{S}{EI}}\, L$$

The exact form of this function is doubtful since its derivation involves assumptions which are not necessarily representative of the actual conditions existing in a box. By using a similar device to that used with steel columns, that is, plotting a curve of the values of P/SL against $\sqrt{S/EI} \times L$ as determined by experimental data, unknown factors affecting box

Fig. 1

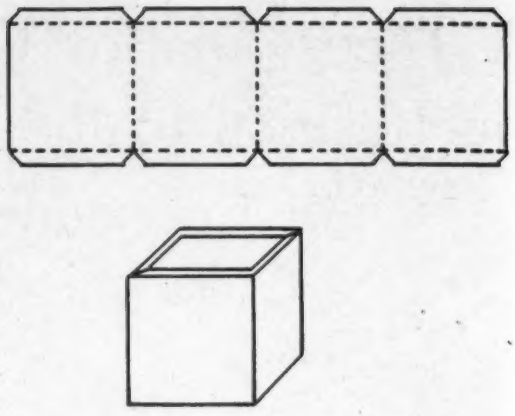

Fig. 2

compressive resistance tend to be automatically eliminated. This same relationship can be derived from Euler's column formula. The form of the equation is not the same but P/SL equals a function of $\sqrt{S/EI} \times L$ in both cases.

The expression P/SL and $\sqrt{S/EI} \times L$ may readily be evaluated from experimental data since:

P = Maximum load on one side of a box
S = Maximum stress per inch when pressure is applied parallel to the corrugations
EI = Modulus of elasticity times the moment of inertia per inch of cross section when the cross section is taken to the perpendicular to the corrugations
L = Length of the box side.

It may have been observed that no provision was made for the directional characteristics of paperboard in deriving the equation. This would probably affect its value were it not for the fact that under the conditions existing in these tests the ratio of the *machine* direction and *cross* direction values of EI are not far from constant for all fourdrinier paperboard and likewise for all cylinder paperboard. The experimental data tends to confirm this fact because when the values of P/SL are plotted against the values of $\sqrt{S/EI} \times L$ two somewhat different curves result; one for fourdrinier board and one for cylinder board. No data were collected for board made of a combination of cylinder and fourdrinier sheets though no doubt the values would be between those determined for the all fourdrinier and all cylinder boards.

The evaluation of the four quantities P, S, EI, and L necessitated the development of two tests for the determination of S and EI, as well as a unique method for evaluating P which reduced the usual manufacturing variables such as scoring, printing,

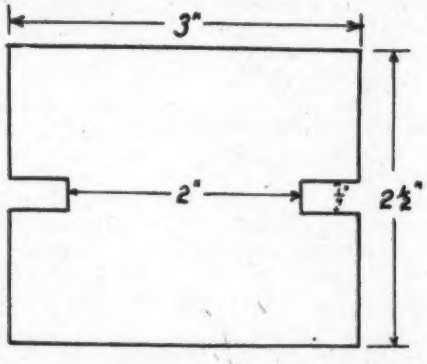

Fig. 3

uneven application of adhesive, etc., to a minimum. The humidity conditions for all tests were maintained at 45% R.H. and 72° F. It is important that all tests be made at the same humidity though not necessarily at 45%.

A box shape was devised which enabled the manufacture of a large number of box lengths from the same run of board, without altering the setting of the scoring wheels. Figure 2 indicates how this was accomplished. The flaps were all made 2 inches wide with notches instead of slots at the corners. The maximum compressive resistance of this shape is nearly identical to that of a regular slotted box of the same dimensions. This shape was used in preference to regular slotted boxes primarily because we wished to avoid the usual variations encountered in commercially run boxes. Square box shapes were tested in all cases and the maximum Olsen compression load was divided by four to arrive at the value of *P*.

The quantity *S*, which was defined as the maximum stress per unit length, may be evaluated by measuring

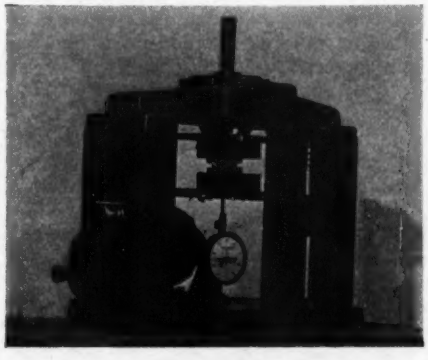

FIG. 4

the resistance of a small test piece to direct compression loads, while reducing the bending effect to a minimum. For this purpose a test piece (Fig. 3), 2½ by 3 inches in size with ¼ by ½ inch slots cut in each end was found to be suitable. This shape insures a failure in the narrow 2-inch section at the center of the test piece rather than at the top or bottom where otherwise the failures would occur. The slots should be made accurately avoiding damage to the board in the 2-inch space between slots. A power-driven saw was found to be a convenient and rapid means of accurately slotting the board. The

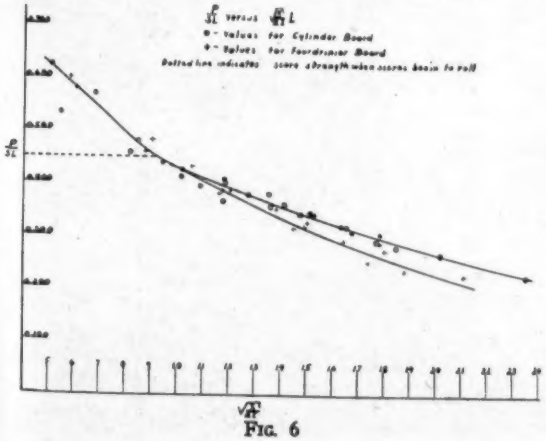

FIG. 6

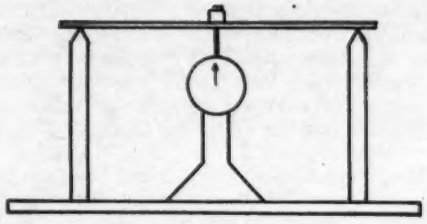

FIG. 5

compressive resistance of this test piece is found by clamping it firmly in jaw ⅞ inch deep attached to the plates of a compression machine, thus preventing the tendency of the test piece to bend, except in the ¾ inch space between the jaws believed to be negligible.

The maximum load on this test piece divided by 2 is *S*, the maximum stress per inch of length. A sufficient number of tests should be made to assure a representative value for the material. Particular care should be taken to avoid finger lines at the waist of the test piece since the value of *S* is greatly affected by poor adhesion at the finger lines.

It is important that the quantity *S* be expressed in absolute units, (lb. per inch); therefore a compression machine which is readily calibrated against gravity is essential. The H&D crush tester (described in the PAPER TRADE JOURNAL of March 10, 1938) meets these requirements and has proved satisfactory for this test. Figure 4 shows this tester with clamping jaws attached to the upper and lower plates holding the test piece used in determining *S*.

The Stiffness factor *EI* defined as the modulus of elasticity times the moment of inertia of a cross section of unit length may be found by measuring the deflection *d* at the center of a beam of the board supported at points a distance *L* apart and loaded at the center with a weight *W*. If *b* is the width of the beam and the quantity *EI* is defined as above, then *EIb* is the modulus of elasticity times the moment of inertia of a beam of width *b*. The formula (found in Mark's "Mechanical Engineering Handbook") for the deflection of a simple beam may be written as follows:

$$EI = \frac{WL^3}{48db}$$

In measuring the deflection of the beam, the weight *w* should be chosen so that the value of *EI* is the same when tested with a greater load, say 1½*w*. *d* must be determined to the nearest 0.001 inch and care must be exercised in measuring this deflection

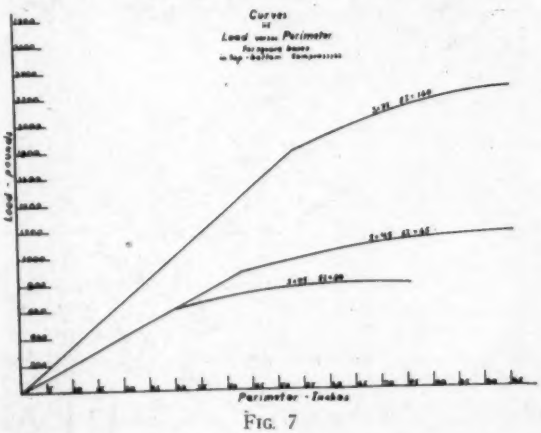

FIG. 7

so that no pressure is applied to the beam by the measuring device. In practice it was found desirable to start with two weights on the beam and measure the deflection when one weight was removed; then, turn the beam over, repeating the measurement. Figure 5 indicates the essential features of the device used for measuring *EI*.

By the methods described in the foregoing paragraphs, tests were made on widely different boards and box sizes varying from 6 inches square to 24 inches square. Table I gives a summary of these tests showing values of *P, EI, S, L,* and the calculated values of P/SL and $\sqrt{S/EI} \times L$ for a wide variety of materials. Curves plotted from this data are shown in Fig. 6. It will be seen from these curves that regardless of whether the board was *A* or *B* flute, double- or single-walled, 0.016 or 0.030 inch caliper, fourdrinier paperboard gave points close to one curve and cylinder paperboard gave points along another curve. From these two basic curves any number of curves of load vs. perimeter for square boxes may be plotted for any value of *S* and *EI* which may be chosen. The horizontal dotted line at a value of P/SL of 0.450 represents the probable upper limit of score strength for most boxes. In other words when the load per inch exceeds 45% of the maximum stress per inch the scores will probably roll allowing a box deflection in excess of the standard deflection. The maximum compressive resistance of boxes in this range tends to vary more widely because of the large differences in relative score strength normally encountered. In plotting the curves of load against perimeter (Fig. 7), the basic curves were used except where the value of P/SL would have exceeded 0.450 at which point the dotted line was followed.

These curves indicate a possible practical use which could be made of the relationship between *P. S. EI,* and *L.* Standard top-to-bottom compression tests could be calculated from standard values of *S* and *EI,* and a closer check could be made on the quality of corrugated board without resort to the Olsen compression test.

While the data so far accumulated does not cover all possible combinations of paperboard, a sufficiently representative group of boards were tested to justify the conclusion that the board compression strength and stiffness factor represented by *S* and *EI* bear a definite physical relationship to box compressive resistance when applied to corrugated board just as these properties of steel bear a definite relationship to the strength of beams and columns, and that therefore these are the factors controlling the ability of boxes to resist distorting forces. No effort has as yet been made to extend this work to include the end to end compression test on boxes.

The conclusions reached in this progress report are based on data collected at one particular manufacturing plant. It is conceivable that the relationships found under these conditions would not apply under the manufacturing conditions existing in all corrugating plants.

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3. McCready, D. W., *Tech. Assoc. Papers* 20:314:319(1937)
4. Wells, *Fibre Containers* 25, No. 10:8 (Oct. 1939) 24, No. 11:8 (Nov. 1939).
5. Drewsen, *Paper Trade J.* March 10, 1938.

TABLE I

Liner Caliper in.	Jute or Kraft	Double or Single Wall	A or B Flute	Box Height, inches	L, inches	P	S	EI	$\frac{P}{SL}$	$\sqrt{\frac{S}{EI}}L$
.016	Jute	S.W.	A	14	6	173	46.2	64.9	.624	5.08
.016	Jute	S.W.	A	14	8	211	46.2	64.9	.571	6.75
.016	Jute	S.W.	A	14	10	222	46.2	64.9	.482	8.45
.016	Jute	S.W.	A	14	12	236	46.2	64.9	.426	10.15
.016	Jute	S.W.	A	14	14	260	46.2	64.9	.402	11.83
.016	Jute	S.W.	A	14	16	283	46.2	64.9	.383	13.52
.016	Jute	S.W.	A	14	18	288	46.1	65.5	.346	15.10
.016	Jute	S.W.	A	14	20	289	46.1	65.5	.313	16.75
.016	Jute	S.W.	A	14	22	288	46.1	65.5	.285	18.45
.016	Jute	S.W.	A	14	24	297	46.1	65.5	.268	20.15
.016	Jute	S.W.	B	10	8	160	48.4	30.0	.414	10.15
.016	Jute	S.W.	B	10	10	183	48.4	30.0	.378	12.70
.016	Jute	S.W.	B	10	12	200	48.4	30.0	.344	15.25
.016	Jute	S.W.	B	10	14	208	48.4	30.0	.307	17.80
.030	Cyl. Kraft	S.W.	A	12	8	315	73.7	159.0	.535	5.43
.030	Cyl. Kraft	S.W.	A	12	12	406	73.7	159.0	.458	8.15
.030	Cyl. Kraft	S.W.	A	12	16	465	73.7	159.0	.394	10.88
.030	Cyl. Kraft	S.W.	A	12	20	531	73.7	159.0	.360	13.60
.030	Cyl. Kraft	S.W.	A	12	24	569	73.7	159.0	.321	16.32
.030	Cyl. Kraft	D.W.	B-B	14	16	805	123.0	228.5	.408	11.75
.030	Cyl. Kraft	D.W.	B-B	14	20	839	123.0	228.5	.341	14.70
.030	Cyl. Kraft	D.W.	B-B	14	24	863	123.0	228.5	.292	17.65
.030	Jute	S.W.	B	14	8	245	69.5	50.3	.440	9.40
.030	Jute	S.W.	B	14	10	255	69.5	50.3	.367	11.75
.030	Jute	S.W.	B	14	12	302	69.5	50.3	.363	14.12
.030	Jute	S.W.	B	14	14	313	69.5	50.3	.322	16.44
.030	Jute	S.W.	B	14	20	313	69.5	50.3	.225	23.50
.016	47 lb. Kraft	S.W.	A	14	8	223	46.4	88.7	.600	5.80
.016	47 lb. Kraft	S.W.	A	14	12	257	46.4	88.7	.461	8.72
.016	47 lb. Kraft	S.W.	A	14	16	285	46.4	88.7	.383	11.60
.016	47 lb. Kraft	S.W.	A	14	20	294	46.4	88.7	.317	14.48
.016	47 lb. Kraft	S.W.	A	14	24	279	46.4	88.7	.251	17.36
.016	47 lb. Kraft	S.W.	B	14	8	167	47.1	34.2	.443	9.38
.016	47 lb. Kraft	S.W.	B	14	10	182	47.1	34.2	.387	11.70
.016	47 lb. Kraft	S.W.	B	14	12	198	47.1	34.2	.351	13.80
.016	47 lb. Kraft	S.W.	B	14	14	192	47.1	34.2	.292	16.40
.016	47 lb. Kraft	S.W.	B	14	16	178	47.1	34.2	.236	18.75
.016	47 lb. Kraft	S.W.	B	14	18	194	47.1	34.2	.229	21.05
.016	47 lb. Kraft	D.W.	B-B	14	12	512	88.5	158.0	.483	9.00
.016	47 lb. Kraft	D.W.	B-B	14	16	546	88.5	158.0	.387	11.70
.016	47 lb. Kraft	D.W.	B-B	14	20	572	88.5	158.0	.323	15.00
.016	47 lb. Kraft	D.W.	B-B	14	24	582	88.5	158.0	.275	18.00
.016	42 lb. Kraft	S.W.	A	14	8	239	51.5	91.2	.580	6.03
.016	42 lb. Kraft	S.W.	A	14	14	315	51.5	91.2	.437	10.55
.016	42 lb. Kraft	S.W.	B	14	8	145	43.9	38.8	.411	8.50
.016	42 lb. Kraft	S.W.	B	14	14	196	43.9	38.8	.318	14.9
.016	42 lb. Kraft	D.W.	B-B	14	20	544	94.5	118.5	.288	17.8

Note: Straw corrugating was used in every case. The liners were the same on both sides of the single-wall board. All three liners were the same in the double-wall board. Kraft is understood to mean fourdrinier kraft except where preceded by cylinder.

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Coffee Filters Dutiable at 30 Per Cent

The United States Court of Customs and Patent Appeals has held that Japanese coffee filters in disc form are dutiable at 30% as paper cut into shapes according to a report issued by Warren B. Bullock, manager of the Import Committee of the American Paper Industry. The filters had been classified as tissue paper at 6 cents per yound and 20%, on the basis of testimony in a New York case that the paper of which the discs were made was commercially known as tissue paper and not as filtering paper.

In the New York case extensive testimony was given as to the nature of the paper in question, but the Customs Court held the paper to be filtering paper at 5 cents per pound and 15% because of its actual use, a decision which was reversed by the higher court. In Los Angeles, a similar case was tried, and the Court again held that the discs were dutiable as filtering paper.

The Appellate Court, however, now holds that neither rate is correct, but that all filtering paper in disc form is dutiable at 30% as paper cut into shapes. In the case just decided this rate is somewhat higher even than the 6 cents per pound and 20% rate originally levied by the collector. On the basis of the Appellate Court's decision, the higher priced chemical filtering paper will also be dutiable, if imported in disc form, at 30%. This is much higher than 5 cents per pound and 15%, the rate originally fixed for filtering paper by the Tariff Act.

The British Reciprocal Trade Agreement reduced the duty to 2½ cents per pound and 7½ percent for paper valued at over 75 cents per pound, a rate which, under the new decision, will only apply to filtering paper in sheets or rolls.

Teaching Women to Run Trucks

By providing a short-cut method for teaching women to operate power trucks, which do the back-breaking jobs of lifting and carrying in war plants, Elwell-Parker Electric Company is offering factories a way to help ease the manpower shortage. Industry may need an additional 3 million women this year.

Elwell-Parker, one of the largest makers of industrial trucks, made a survey to find out how many companies were using women to operate their industrial trucks. The survey showed only 3%, or 19 of the 706 firms replying, had women industrial truck operators. Over 50%, however, indicated interest in substituting women for men operators.

Today there are about 30,000 industrial trucks in service moving raw materials, parts, boxes and other items in plants and warehouses. While an Elwell-Parker truck does the work of 5 to 10 men, a woman operator can transport up to 10 tons with one of them and exert less physical effort than she uses in carrying a baby upstairs.

To help companies break in women drivers of their own and other makes of industrial trucks, Elwell-Parker has prepared an easy-to-understand book of instructions, called, "Lady, will you give A Lift?" Illustrated with over 20 pictures, the manual tells the prospective woman operator how to run the truck, gives pointers on how it should be cared for and explains the importance of the job.

With the aid of the manual, women can be taught to drive an industrial truck in as short a time as a day. Hit-and-miss instruction often makes the learning time as long as a week.

New Literature

V-belting and link V-belting is discussed in a new catalogue issued by the Manheim Manufacturing and Belting Company, Manheim, Pa. It describes the production advantages of the company's "Veelos" belting, illustrates some of its many applications and gives instructions on installing the belt on the drive.

Woman operation of power industrial trucks, is the subject of an instruction pamphlet, issued by the Elwell-Parker Electric Company, Cleveland, Ohio. It explains how women may become proficient in the handling of power trucks to supplement the diminishing supply of manpower in industrial plants.

Formulation and uses of stains, is discussed in Calco Technical Bulletin No. 668, issued by the Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J. It covers the major types of surface coloring, properties, penetration, etc., exact color specifications, the general application, applications and properties of synthetic dyes. Basic dyes, direct dyes and the dispersion characteristics of dyes are covered. Tables facilitate reference to the application, general nature, tinting power, solubility and fastness qualities of various dyes.

Centrifugal pumps for paper mill service, are described in Bulletin No. 78-S, issued by Shartle Brothers Machine Company, Middletown, Ohio. It covers the company's Miami Class DV, self-draining stock pump, which is built in sizes from 4 in. to 12 in. discharge, and in capacities from 450 G.P.M. to 4800 G.P.M., and for handling stock up to 6% consistency.

Alkali products are discussed in a 30-page booklet issued by the Solvay Sales Corporation, 40 Rector street, New York. It provides specific information on forms, chemical and physical properties of the company's products and their uses.

Cast tooth sprocket wheel sizes, now available, are listed in Folder No. 2057, issued by the Link-Belt Company, 307 N. Michigan avenue, Chicago, Ill. It tabulates the sizes of wheels most commonly ordered over a period of years, and which are obtainable from present stocks.

Practical Emulsions

The Chemical Publishing Company has recently published an interesting book (462 pages) by H. Bennett, Chemical Director of Glyco Products Company, Inc. This is essentially a handbook on emulsions, emulsifiers, and methods of formulating and making emulsions of practical value for industry. It touches but lightly on the theoretical colloidal aspects.

Among the subjects covered are the following: emulsifying agents, types of emulsions and foams, equipment and methods of formulations, demulsifying and defoaming agents, bituminous emulsions, cleaners and soaps, lacquer emulsions, paper processing emulsions, resin and rubber emulsions, waterproofing and wax emulsions, dispersing and wetting agents.

Under paper processing, emulsions are given various paper size waterproofing, deinking and high paper lustre formulae.

In all the chapters products are mentioned both by trade name and composition.

Copies may be obtained through the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York 17, N. Y. at $5.00 per copy.

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Office of the PAPER TRADE JOURNAL.
Wednesday, June 16, 1943.

The wholesale paper market continues to report a strong demand for all major paper items. Delivery delays, due to increasing transportation difficulties, labor shortage and restrictions imposed on all civilian business to further the progress of the war, make it difficult to conduct a balanced distribution today. A somewhat tighter supply situation in sulphite bonds and in some grades of paper board, are also reflected in current reports received from many manufacturers' representatives, jobbers, and general paper merchants.

Paper production for the week ended June 5, which included the Memorial Day holiday, was estimated at 85.5%, compared with 90.2% for 1942, with 96.8% for 1941, with 91.3% for 1940, and with 79.3% for the corresponding week for 1939.

Paper board production for the week ended June 5 was 92.0%, compared with 69.0% for 1942, with 84.0% for 1941, with 77.0% for 1940, and with 79% for the corresponding week for 1939.

Production of non-durable goods, according to the latest report by the Department of Commerce, dated April, states such industries have continued to produce the usual peace time products, although many mills have had to alter the character of their output to fit military specifications or to suit export requirements. In 1942, one-fourth of non-durable goods shipment by manufacturers was for war use. This year one-third will be for war use. Total volume of sales for civilians is still well maintained, amounting to $41 billion in each of the years 1941 and 1942, and estimated at $38 billion for 1943.

The Department's index of the value of manufacturers' inventories, all industries, was 175.2 for April, 1943, compared with 167.0 for April, 1942; total durable goods, 213.1 for April, 1943, compared with 186.6 for April, 1942; total non-durable goods, 142.1 for April, 1943, compared with 149.9 for April, 1942.

The index of the value of manufacturers' inventories for paper and allied products was 139.0 for April, 1943, compared with 141.1 for April, 1942.

The Department of Commerce index of the value of manufacturers' shipments, all industries, was 253 for April, 1943, compared with 200 for April, 1942; total durable goods, 338 for April, 1943, compared with 239 for April, 1942; non-durable goods, 186 for April, 1943, compared with 168 for April, 1943.

The index of the value of manufacturers' shipments for paper and allied products for April, 1943, was 159, compared with 165 for April, 1942. The low point of 1943 thus far was 138 in January, 1943, and in 1942 the low index figure was 126 in July, 1942.

Wood Pulp

The chemical wood pulp market is strong, with current reports indicating the expectancy of a continued strong demand in view of the serious manpower situation in the cutting of pulpwood. Many reports reflect the opinion that inadequate labor in the production of wood must inevitably be most seriously felt and must continue unfavorable during the duration of the war.

Rags

The steady demand for colored cuttings continues to be reported at this date, with the supply, in most cases, inadequate for mill requirements. Mill buying of new white cuttings is fair, with current prices below the ceilings. All prices are unchanged.

Old Rope and Bagging

All grades of old rope are in strong demand with prices at the ceiling level. Old No. 1 Manila rope is scarce. Some sales of jute strings at 4.50 and mixed strings at 1.25 are reported.

Amendment of General Conservation Order M-294, permits the use of waste Manila rope to a limited extent in the production of sack papers for flour and cereal products and for abrasive papers. The continued use of this grade of fiber is permissible in the manufacture of insulating and gasket base papers, artificial leather base papers, and in tag papers for use by the armed forces.

Old Waste Paper

Mill buying of old waste paper is reported active this week. Supply is in good volume but no substantial increase is looked for in the trade, as lack of labor for sorting and packing is quite acute. All grades of paper stock are firm at ceiling prices and the market is widely reported as strong.

Twine

The twine market is firm, with considerable comment to the effect that the wide employment of sisal, especially for cordage, is not very satisfactory from the consumer's end. Prices are firm with demand for some standard grades substantially in excess of the active demand.

Henry F. Obermanns Retires

ERIE, Pa., June 14, 1943—After nearly 30 years of continuous service with Hammermill Paper Company, Henry F. Obermanns, vice-president in charge of manufacturing, has retired because of ill health. Mr. Obermanns, it was said today, is retiring from active service with Hammermill, but will continue to be associated with the company as a consultant. The veteran paper mill executive, who resides at 1938 E. Lakeside Dr., was first associated with Hammermill between 1904 and 1910, during which time he served in a number of capacities. He then left Erie and for the next four years was active in the management of several northeastern paper mills.

Returning to Hammermill in 1914, he has since then served as general superintendent, assistant to the president, a member of the board of directors and as vice-president in charge of the board of directors and as vice-president in charge of manufacturing.

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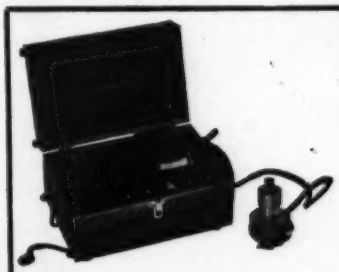

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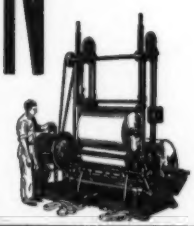

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, June 16, 1943.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. The pulp is currently quoted at $40 per ton in barrels, at works; the powder is offered at $60 per ton, f.o.b., works. Demand reported fair for the week.

BLEACHING POWDER—Prices on bleaching powder are firm. Current demand reported good. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 100 bags or more, 21 cents per pound; 20 bags, 21¼ cents per pounds; less than 20 bags, 21¾ cents per pound, f.o.b., shipping point.

CAUSTIC SODA—Prices on caustic soda are reported unchanged. Demand for the current week is reported heavy. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Demand reported fair for the current week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Government demand for war use continues heavy. Prices firm. Chlorine is currently quoted at from $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—Quotations on some grades of rosin are lower for the current week. "G" gum rosin is currently quoted at $3.54 per 100 pounds in barrels, Savannah. "FF" wood rosin is currently quoted at $3.44 per 100 pounds in barrels, New York. Seventy per cent gum rosin size is currently quoted at $3.73 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand reported moderate for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand heavy. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch continue to be reported unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Supply more limited for the current week. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices of sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $16 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—

Roll, contract	*$54.00	@	—
Sheets	62.00	"	—

* OPA Maximum Price.

Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill

Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—

* OPA Manufacturers' Prices.

Tissues—Per Ream—Carlots

White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—

Toilet—1 M. Sheets—Per Case

Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—

Paper Towels, Per Case—

Unbleached, Jr.	2.60	"	—
Bleached, Jr.	3.20	"	—

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00

Boards, per ton—

News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

100% Rag Ext.	Bonds	Ledgers
No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00
Unbl. Softwood Sulphite	65.00@ 66.00
Bl. Hardwood Sulphite	73.50
Unbl. Hardwood Sulphite	63.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich	72.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	62.00
S. Semi-Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	66.00
Unbl. Soda	62.00
Groundwood	46.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—New White, No. 1	6.50	@	7.25*
Silesias No. 1		"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

* OPA Maximum Prices.

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Old Rags

White, No. 1—		
Repacked	*3.00	—
Miscellaneous	*3.20	—
White, No. 2—		
Repacked	*2.90	—
Miscellaneous	*2.65	—
Third and Blues—		
Repacked	*2.20	—
Miscellaneous	*1.80	—
Roofing Rags—		
No. 1	*1.55	—
No. 2	*1.45	—
No. 3 (bagging)	*1.35	—
No. 4	*1.35	—
No. 5A	*1.35	—
Old Manila Rope	5.75	—

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags		
New Dark Cuttings	2.25 @	2.40
New Mixed Cuttings	2.00 "	2.20
New Light Silesias	5.50 "	5.75
Light Flannelettes	5.50 "	5.75
New White Cuttings	7.00 "	7.50
New Light Oxfords	4.00 "	4.50
New Light Prints	3.00 "	3.25
Old Rags		
No. 1 White Linens	7.50 "	8.50
No. 2 White Linens	6.50 "	7.50
No. 3 White Linens	4.50 "	—
No. 4 White Linens	2.25 "	3.25
No. 1 White Cotton	4.25 "	4.75
No. 2 White Cotton	3.25 "	3.75
No. 3 White Cotton	2.50 "	3.00
No. 4 White Cotton	1.90 "	2.20
Extra Light Prints	2.00 "	2.40
Ord. Light Prints	1.75 "	2.15
Med. Light Prints	1.55 "	1.95
Dutch Blue Cottons	2.25 "	2.50
French Blue Linens	3.00 "	—
Checks and Blues	2.00 "	—
Linsey Garments	1.90 "	2.00
Dark Cottons	1.50 "	1.60
Old Shopperies	1.30 "	1.45
New Shopperies	1.45 "	1.50
French Blues	2.25 "	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—		
Foreign	Nominal	
Domestic	4.25 @	4.35
Wool Tares, light	4.25 "	4.50
Wool Tares heavy	4.50 "	5.00
Bright Bagging	4.50 "	4.85
Manila Rope—		
Foreign	— "	—
Domestic	*5.75 "	—
Jute Threads	5.50 "	—
No. 1 Sisal Strings	*4.00 "	—
Mixed Strings	2.00 "	—

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½ @	—
No. 1 Hard White Envelope Cuts	3.12½ "	—
No. 1 Hard White Shavings, unruled	2.87½ "	—
No. 1 Hard White Shavings, ruled	2.50 "	—
Soft White Shavings, one cut	2.87½ "	—
No. 1 Soft White Shavings	2.50 "	—
Soft White Shavings, Misc.	2.15 "	—
No. 1 Fly Leaf Shavings	1.67½ "	—
No. 2 Fly Leaf Shavings	1.12½ "	—
No. 1 Groundwood Fly Leaf Shavings	1.25 "	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90 "	—
Mixed Colored Shavings	.75 "	—
Mixed Groundwood Colored Shavings	.90 "	—
Overissue Magazines	1.67½ "	—
No. 1 Heavy Books & Magazines	1.57½ "	—
Mixed Books	.85 "	—
No. 1 White Ledger	2.17½ "	—
No. 2 Mixed Ledger, colored	1.87½ "	—
New Manila Envelope Cuttings, one cut	2.87½ "	—
New Manila Envelope Cuttings	2.65 "	—
Extra Manilas	1.85 "	—
Mixed Kraft, Env. & Bag Cuttings	2.75 "	—
Kraft Envelope Cuttings	3.25 "	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50 "	—
New 100% Kraft Corrugated Cuttings	2.25 "	—
No. 1 Assorted Old Kraft	1.75 "	—
New Jute Corrugated Cuttings	.90 "	—
Old 100% Kraft Corrugated Containers	1.75 "	—
Old Corrugated Containers	1.15 "	—
Box Board Cuttings	.72½ "	—
White Blank News	1.65 "	—
Overissue News	.85 "	—
No. 1 News	.75 "	—
No. 1 Mixed Paper	.70 "	—
Old Corrugated Containers	.82½ "	—
Mill Wrappers	.85 "	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—India	.21 @	—
White Hemp	.21 "	—
Fine Polished—Fine India	.26 "	—
Unpolished—Box	.17½ "	—
Paper Makers	.17 "	—
Tube Rope	.19 "	—
Wall Paper	.20½ "	—
Wrapping	.23 "	—
Soft Fiber Rope	.19 "	—
Cotton	.25 "	—
(Hard Fiber)		
Medium Java	.18 "	—
Mex. Sisal	.16 "	—
Manila	— "	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—		
New White No. 1	.07¼ @	.07½
New White No. 2	.04½ "	.05
Light Silesias	.04½ "	.04¾
Silesias, No. 1	.04 "	.04¼
Black Silesias, soft	.03¾ "	.04
New Unbleached	.07¼ "	.07½
Washable Prints	.03¾ "	.03½
Washable No. 1	.02 "	.02¼
Blue Overall	.04½ "	.05½
Cottons—According to grades—		
Washable shredding	— "	.01¾
Fancy Percales	.03¼ "	.03½
New Black Soft	.02¾ "	.03
New Dark Seconds	1.75 "	2.00
Khaki Cuttings—		
No. 1 O. D.	.03 "	.03¼
No. 2 Mixed	.02¼ "	.02½
Corduroy	.01¾ "	.02¼
New Canvas	.04¾ "	.05¼
New Black Mixed	— "	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80 "	—
White No. 2—Repacked	2.90 "	—
Miscellaneous No. 1	3.20 "	—
Miscellaneous No. 2	2.65 "	—
Thirds and Blues—		
Miscellaneous	1.80 "	—
Repacked	2.20 "	—
Black Stockings—		
(Export)	Nominal	
Roofing Stock—		
Foreign No. 1	Nominal	
Domestic No. 1	1.55 "	—
Domestic No. 2	1.45 "	—
Roofing Bagging	1.35 "	—
Old Manila Rope	5.75 "	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—		
Foreign	Nominal	
Domestic	3.00 "	3.50
Sisal Rope	3.75 "	—
Mixed	1.00 "	1.50
Scrap—		
No. 1	3.25 "	3.50
No. 2	1.75 "	1.80
Wool Tares, heavy	4.00 "	4.25
No. 1 New Light Burlap	3.00 "	4.00
New Burlap Cuttings	3.75 "	4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½ "	—
No. 1 Hard White Shavings, unruled	2.87½ "	—
Soft White Shavings, one cut	2.50 "	—
White Blank News	1.65 "	—
Soft White Shavings, Misc.	2.15 "	—
No. 1 White Ledger	2.17½ "	—
No. 2 Ledger, colored	1.87½ "	—
No. 1 Heavy Books & Magazines	1.67½ "	—
Overissue Magazines	1.67½ "	—
New Manila Envelope Cuttings	2.65 "	—
No. 1 Assorted Old Kraft	1.75 "	—
No. 1 Mixed Paper	.70 "	—
Box Board Cuttings	.72½ "	—
Kraft Corrugated Cuttings	2.25 "	—
Old Corrugated Containers	1.15 "	—
Overissue News	.85 "	—
No. 1 News	1.00 "	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½ @	—
No. 1 Hard White Shavings, ruled	2.50 "	—
Soft White Shavings, Misc.	2.15 "	—
No. 1 Fly Leaf Shavings	1.67½ "	—
No. 2 Fly Leaf Shavings	1.12½ "	—
No. 1 Groundwood Fly Leaf Shavings	1.25 "	—
No. 2 Groundwood Fly Leaf Shavings	.90 "	—
Mixed Colored Shavings	.75 "	—
New Manila Envelope Cuts, one cut	2.87½ "	—
Hard White Envelope Cuts, one cut	3.37½ "	—
Triple Sorted No. 1 Brown Soft Kraft	2.50 "	—
Mixed Kraft Env. & Bag Cuttings	2.75 "	—
Kraft Envelope Cuttings	3.25 "	—
No. 1 Heavy Books & Magazines	1.57 "	—
New Manila Envelope Cuts, one cut	2.87½ "	—
New Manila Envelope Cuttings	2.65 "	—
White Blank News	1.65 "	—
No. 1 Assorted Old Kraft	1.75 "	—
No. 1 Mixed Paper	.70 "	—
Overissue News	.85 "	—
Box Board Cuttings	.72½ "	—
New Corrugated Cuttings, Kraft	2.25 "	—
Old 100% Kraft Corrugated Containers	1.75 "	—
Old Corrugated Containers	1.15 "	—
Jute Corrugated Cuttings	1.07½ "	—

Bagging

(F. o. b. Boston)

Gunny Bagging—		
Foreign	(nominal)	
Domestic	3.75 @	4.00
Sisal Rope No. 1	*4.75 "	—
Sisal Rope No. 2	*4.25 "	—
Mixed Rope	1.35 "	1.50
Transmission Rope—		
Foreign	(nominal)	
Domestic	2.75 "	3.00
Manila Rope—		
Foreign	(nominal)	
Domestic	5.75 "	—
Soft Jute Rope	4.50 "	5.00
Jute Carpet Threads	3.00 "	3.50
Bleachery Burlap	8.50 "	9.00
Scrap Burlap—		
Foreign	(nominal)	
Domestic	3.60 "	3.85
Wool Tares—		
Foreign	(nominal)	
Domestic	4.25 "	—
Aust. Wool Pouches	4.65 "	4.87½
New Burlap Cuttings	4.75 "	5.00
Heavy Baling Bagging	4.00 "	4.25
Paper Mill Bagging	2.50 "	3.00
No. 2 Bagging	1.35 "	—*

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—		
New Light Prints	.04½ @	.04¾
Fancy Percales	.04¼ "	.05
New White No 1	.06¾ "	.07
New Light Flannelettes	.05½ "	.06
Canton Flannels,		
Bleached	.06 "	.06¼
Underwear Cutters,		
Bleached	.06¾ "	.06¾
Underwear Cutters,		
Unbleached	.05¾ "	.06
Silesias No. 1	.06 "	.06¼
New Black Silesias	.03 "	.03½
Red Cotton Cuttings	.03½ "	.04
Soft Unbleached	.06½ "	.06¾
Blue Cheviots	.05½ "	.06
Fancy	.02¾ "	—
Washable	.02¾ "	—
Khaki Cuttings	.02¾ "	.03
O. D. Khaki	.03½ "	.03¾
Corduroy	.03¼ "	.03½
New Canvas	.06¼ "	.06¾
B. V. D. Cuttings	.06¼ "	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—Repacked	3.80 @	—*
Miscellaneous	3.20 "	—*
White No. 2—Miscellaneous	2.65 "	—*
Twos and Blues, Repacked	2.20 "	—*
Old Blue Overalls	2.25 "	2.50
Thirds and Blues, Repacked	2.20 "	—*
Miscellaneous	1.80 "	—*
Black Stockings	3.50 "	4.00
Roofing Stock—		
No. 1	1.55 "	—*
No. 2	1.45 "	—*
No. 3	1.35 "	—*
No. 4	1.35 "	—*
No. 5, Quality A	1.35 "	—*
Quality B	1.20 "	—*
Quality C	.95 "	—*
* Old Manila Rope	5.75 "	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—		
No. 1 Hard White Envelope Cuts, one cut	3.37½ "	—
No. 1 Hard White Shavings, unruled	2.87½ "	—
No. 1 Soft White Shavings	2.50 "	—
No. 1 White Ledger	2.17½ "	—
No. 1 Heavy Books & Magazines	1.67½ "	—
White Blank News	1.65 "	—
Mixed Kraft Env. & Bag Cuttings	2.75 "	—
No. 1 Assorted Old Kraft	1.75 "	—
Overissue News	.85 "	—
No. 1 News	.75 "	—
No. 1 Mixed Paper	.70 "	—
No. 1 Roofing Rags	1.55 "	—
No. 1 Roofing Bags	1.45 "	—